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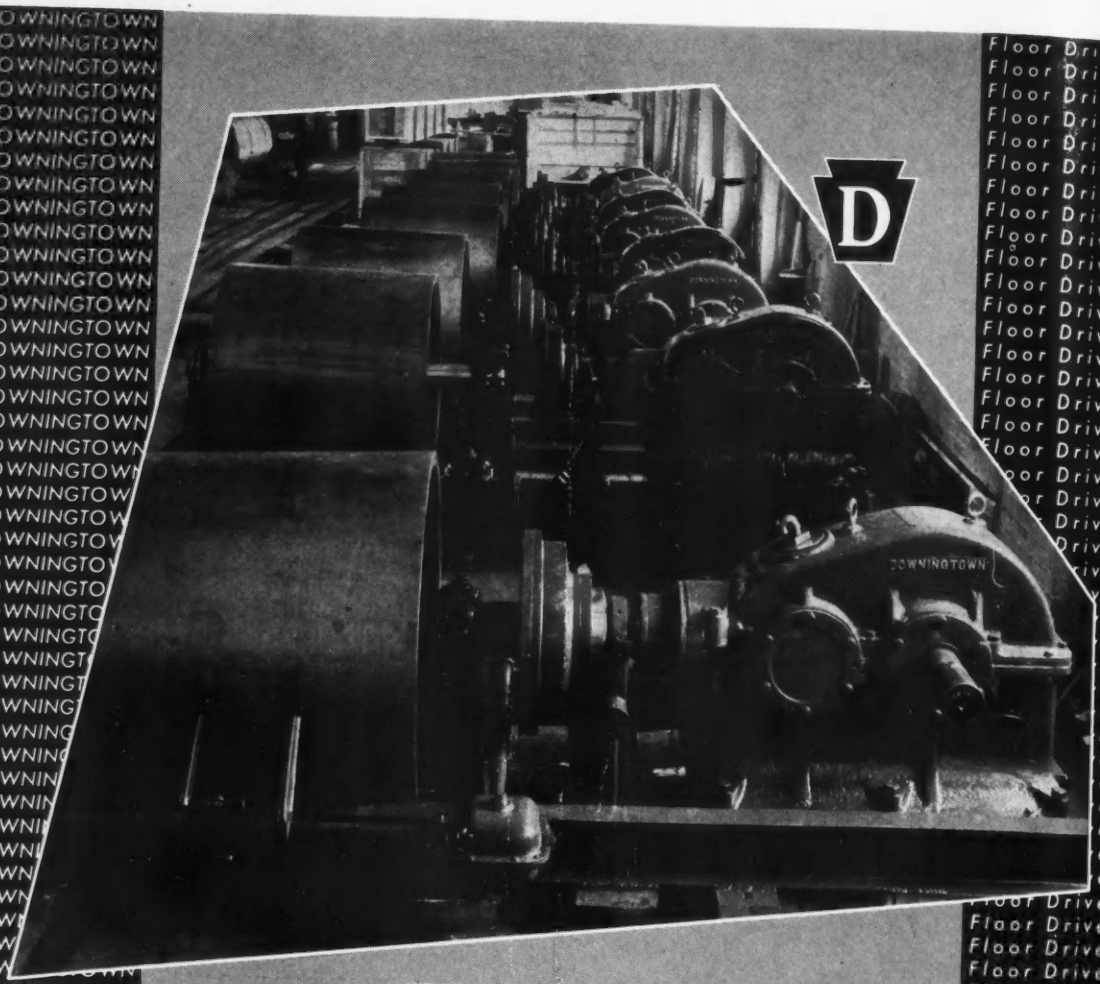

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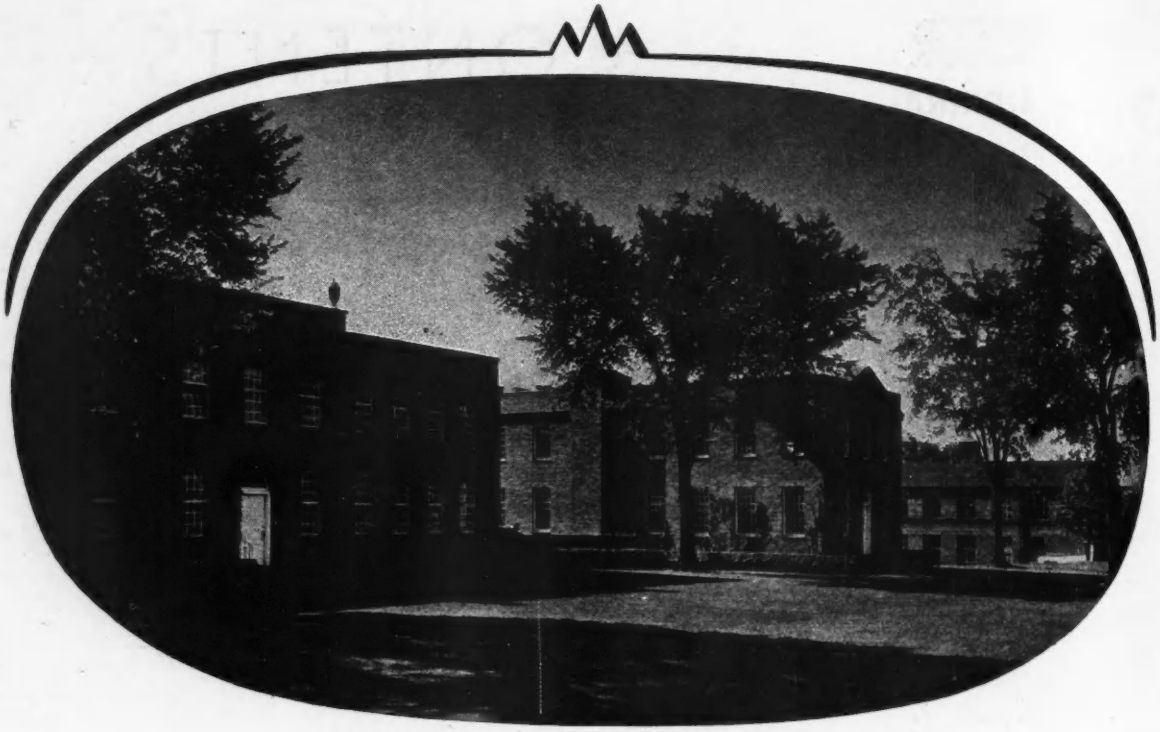

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PAPER TRADE JOURNAL

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October 5, 1944

Mill Employment Maintained in Wisconsin

Industrial Commission Reports No Change In Workers In August —Payrolls Rise 4.8 Percent—More Pulpwood Workers Needed In State — Board Approves Wage Rise — Other Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., October 2, 1944—The number of wage earners in the state's paper and paper products industries, as shown by the monthly report of the Wisconsin Industrial Commission at Madison, Wis., during August was virtually unchanged when compared with July. In round numbers the total was 23,100 in each instance, but there was a gain of 0.2%, when computed from actual rather than rounded figures.

Estimated weekly payrolls, however, showed an increase of 4.8%. The total for August was $931,000 and for July it was $888,000. The average hourly earnings in August were 82.9 cents, or an average total of $40.21 for 48.5 hours.

In the Milwaukee metropolitan area, 21 paper and allied products firms reported 2,154 employes on their payrolls, an increase of 5.4% over July. Weekly payrolls averaged $82,965, representing an increase of 8% over the previous month. The per worker weekly average was $38.52 for 46.2 hours, or 83.3 cents per hour.

Establishes Snow Courses

The Wisconsin Valley Improvement Company, whose main offices are located at Wausau, Wis., is establishing new snow courses at its Burnt rollways, Willow and Rainbow reservoirs in Oneida county and the neighboring area in Vilas county, which will supply moisture data for all reservoirs in that area. A new snow course will be established in the Big Eau Pleine reservoir area, where it will supply similar data for a 365 square mile area.

A ground water well will be established on each of the snow courses and will be fitted with a recorder to provide readings on the underground water supply at various times of the year.

A further installation will be soil thermographs and thermocouples which will supply data on ground temperatures ranging from the surface of the ground to a depth of 5 feet. Calcium sulphite blocks will be placed at various depth intervals and will communicate the subsoil temperatures through electric wires to a master thermograph for furnishing data that will enable the company to ascertain more accurately the release of ground and surface waters in order to improve reservoir and flood control.

More Pulpwood Cutters Needed

The pulpwood and lumber industries in Wisconsin face an increasingly heavy employment demand as the cutting season approaches, according to William E. O'Brien, state director for the War Manpower Commission.

In the major camps expected to operate in the state this year, Mr. O'Brien said, approximately 3,000 woods workers are now needed in excess of the men already employed. During pre-war years, about 5,000 workers were employed in the camps.

Logging camps and sawmills throughout the northern part of the state need the majority of these men as pieceworkers. Operators in the Wausau, Hurley, Rhinelander, Hayward and Ashland areas are now preparing to resume full-scale operations in the early fall, as workers become available, Mr. O'Brien said.

Board Approves Wage Rise

The Regional War Labor Board at Chicago last week announced approval for a general wage increase of 4 cents an hour at the Wausau Paper Mills Company, Brokaw, Wis., increasing the base rates from 55 to 59 cents an hour, effective May 29, 1944. Affected are the International Brotherhood of Paper Makers, Local 381, and Paper Mill Workers, Local 260, a total of 309 workers.

George Mead Reelected Director

George W. Mead, president of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., has been reelected as a director and the president of Riverview Hospital in that city. The meeting was held September 21 at the First National Bank.

Publishing Faces Fourth Year of War

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., October 2, 1944—The critical situation that still exists in the production of pulp and book papers was emphasized in a talk before The Bookbuilders of Boston at the Hotel Lennox Thursday evening by Meiric K. Dutton, assistant to the director, Printing and Publishing Division, War Production Board. In his address, "Publishing Faces a Fourth Year of War," Mr. Dutton stressed also the seriousness of the overall situation, despite the tremendous efforts that had been made to increase the supply of pulpwood and the large increase in production made by the paper mills that have done an outstanding job in the face of many handicaps. A considerable part of his talk related to paper. He presented much important up-to-the-minute information together with forecasts relating to essential materials, manpower and related problems.

More Power Will Aid Some Canadian Mills

Lifting of Wartime Power Restrictions Will Enable Some Newsprint and Other Mills To Increase Capacity—General Feeling For Future Is Optimistic—Financial Condition of Industry Is Excellent.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., October 2, 1944—Some measure of relief for the newsprint situation is seen in the fact that, effective yesterday, power restrictions which have kept street lights dimmed, shop windows and advertising signs blacked out, and some newsprint mills on curtailed production for two years, have been lifted in all provinces except British Columbia. It is explained by the Minister of Munitions that the power situation is now sufficiently good to allow of this being done, and that the exception in the case of British Columbia is due to the fact that in that province an unprecedented drought, combined with a most difficult oil situation, makes it absolutely essential that all restrictions now imposed locally be obeyed.

Newsprint officials here express some doubt as to whether the removal of the power restrictions will bring about any appreciable immediate increase in the output of newsprint. They say that while plenty of power will be available they are short of wood pulp. The pulpwood shortage is fairly general throughout Eastern Canada, except possibly in the Saguenay district. The Saguenay mills are still diverting power to war plants. These mills are close to pulp supplies, and possibly with the increased power now made available will be able to step up production somewhat, but they are an exception. It is agreed that the removal of the power restrictions will not be likely to have any effect on the fourth quarter quota of 200,000 tons of newsprint which Canadian producers have undertaken to supply to the United States. Paul Kellogg, general manager of the Newsprint Association of Canada, states that, except in the case of the Ontario Paper Company's mill at Thorold, which had been restricted to 40% of its production, and the Beaver Wood Fiber mill at Thorold, which has been shut down completely because power had been cut off, restriction of production had been due more to the lack of wood and man power than to lack of electric power. Said Mr. Kellogg: "It all depends upon how long it will take these mills to get set up again whether the production of newsprint will increase. They have to get crews and have to find material, and that is the big problem in newsprint today. We hope that we will be able to increase our supply of newsprint for export, but we don't expect it for this quarter of the year." He added that Quebec represents about 60% of the capacity for producing newsprint, and except for the first few months of 1943 its mills had not been restricted as regards power; there had always been sufficient for the operations that could be carried on. The newsprint industry throughout the Dominion was now operating at 70% of capacity.

Mr. Kellogg's views are corroborated by A. Schmon, manager of the Ontario Paper Company at Thorold, which company also owns the big newsprint plant at Comeau Bay in Quebec. He said there is little chance of the newsprint shortage being alleviated before next spring, despite the lifting of power restrictions. As far as his company was concerned, the lifting of the restrictions had come too late to permit of ordering the adequate supplies of pulp even if the labor required in obtaining it were available. "Every step possible to increase the supply of pulp will be taken," he said, "but the navigation season closes around November 1, so that very little pulpwood can be shipped in by then. The company will be able to operate one additional machine, starting at once, but no more unless raw materials are available."

Optimistic Over the Future

There is a general feeling that with the lifting of the power restrictions the crisis in the supply of newsprint and wood pulp is over, and that the production of both will show a gradual increase from now on. Equally optimistic is the view in regard to the industry after the war in Europe is brought to a close.

The record of the industry during the war has been remarkable. Despite all manner of restrictions, coupled with the shortage of transportation and of man power, the industry has turned out substantially more newsprint than in war years, being practically the only source of supply for other countries, both on this continent and abroad. At the same time it has increased its exports of pulp by nearly 300% per cent over pre-war levels. In addition to this there has been a sharp expansion in the production of kraft paper, boxboard, building materials, munition parts, parts for aircraft and other war machines, and paper containers, all made from pulp. The many new uses discovered for the use of pulp as a raw material has greatly widened the outlook for pulp production in peace time, and the leading companies have plans all prepared for improving plant facilities to widen their productive activities and to take advantage of war time research in new types of products.

Industry in Fine Financial Shape

As to its financial position, the industry is in the best shape in its history, there having been a continuous strengthening of balance sheet positions. On this point the *Financial Post* makes this statement:

"Between the end of 1937 and the end of 1943 the 15 leading pulp and paper companies:

"Increased their holdings of cash, government bonds, etc., from about $8¼ millions to over 50½ millions.

"Increased their working capital from slightly above $29½ millions to nearly $96½ millions.

Reduced bank loans from just under $22 millions down to $3½ millions. Reduced aggregate funded debt from $168½ millions to less than $131 millions, or 22%.

"Thus, as one important asset for the pulp and paper industry in the post-war years is the common experience of greatly strengthened financial position generally.

"The leading companies, instead of dissipating financial resources as was done in the earlier years of the industry, are now soberly planning, with the longer term in mind."

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Midwest Expects Shortages Will Continue

Heavy Demand, Manpower and Transportation Situations May Curtail Paper Supply When War Ends—Salesmen Open Fall Meetings Oct. 16—Waste Paper Amendment Approved—Other News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., October 2, 1944—Now that the Chicago paper market has fully digested the news including the fourth quarter pulp allocations and the production reports from the various mills, there is a growing tendency here to believe that genuine—and in some cases drastic shortages will be in effect for the next six to ten months even if certain phases of the war effort were to terminate at once. Allocations were little changed over the previous quarter but the growing demand for paper from all quarters and the tremendous backlog of orders plus the manpower situation are all expected to combine to make the market situation tense for a "long time."

On top of this, the industry was having trouble with certain phases of its transportation problem and finding it increasingly difficult to anticipate deliveries when such deliveries are possible. The board market was very tight despite efforts to create more interest in an over-all salvage program. Krafts and wrappings were similarly placed while the groundwood and newsprint market showed only signs of getting more involved. Sulphites were unchanged while books and covers were having an increasingly difficult time as the tempo of fall business increased. Waste paper supplies were still inadequate though improved over last week. Good weather, special drives and new waste paper price changes were reported to be getting some results.

To Study Sampling Program

Six Chicago and midwestern paper trade executives have been appointed to a committee of the National Paper Trade Association which will survey conditions in this region pertaining to the possible later development of a post-war paper sampling program. Development of the subject of how best to sample printing papers in this region will be under the chairmanship of George Mueller, Zellerbach Paper Company, Chicago. Another Chicagoan, Gregg Frelinger of the J. W. Butler Paper Company, will serve as a regional vice chairman along with Don Jacobs, Seaman-Patrick Paper Company of Detroit; H. M. Zimmerman, Johnston Paper Company, Cincinnati; A. W. Leslie, John Leslie Paper Company, Minneapolis and Perry Lest, C. P. Lesh Paper Company, Indianapolis.

It is expected that this program will be discussed at the regional conference of the National Paper Trade Association which will be held at the Hotel Stevens, Chicago, on October 5. It was also announced here this week that the Post War Planning Committee of the N.P.T.A. would meet during the day, with its sessions to be held at The Blackstone Hotel. It is expected that a similar committee of the American Paper and Pulp Association will be invited to participate in the discussions concerning post-war possibilities and problems of the paper industry.

Salesmen Plan Interesting Meeting

The Western division of the Salesmen's Association of the Paper Industry will open its speaking sessions for the fall and winter season on October 16 when the Conservation Commission of the State of Wisconsin will show four color movies, equipped with sound, all portraying the unusual beauties and sports resources of that State. The showing was secured through the cooperation of Arch G. Hepburn of the Tomahawk Kraft Paper Company, a member of the SAPEYES. One of the films is entitled "Fetch" and shows the use of hunting dogs in the various hunting spots of Wisconsin. Another is called "Nature's Grouse" showing scenes of grouse breeding and hunting; a third is picturesquely entitled "Tight Line" and shows scenes of trout, bass and muskie fishing. The fourth, "North East Lakeland," is a beautiful portrayal of Wisconsin forests and parks.

The Western division has been adhering to round table discussions only for the present time, using the September 25 meeting to analyze pulp allocations and to plan for participation in the forthcoming regional meeting of the N.P.T.A.

It was also announced at the meeting that Albert M. Forsythe of the Chicago office of Fraser Industries Incorporated, was slated to go to Washington in October as a dollar-a-year man connected with the paper division of the War Production Board. Mr. Forsythe is a veteran paper trade executive with a wide acquaintance both in this area and in the East.

Waste Paper Amendment Helps

It was reported here that the trade had reacted favorably to the recent amendment to MPR 30, effective September 11, which removes the regulation on certain industrial grades of wastepaper that a bale must weigh no less than 500 pounds in order to qualify for the differential permitted for machine compressed bales. The order, now nullified, was a bone of contention in the area for some time. It is reported that the change will materially improve the possibilities for salvaging more waste paper in this area.

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Pulp Production and Consumption

The data herewith presented cover all known mills and are revisions of the statistics shown in "Facts for Industry," Series 24-1-1 and 24-1-2 and "Census of Pulp Mills and of Paper and Paperboard Mills: 1941." All inquiries regarding these data should be addressed to the Bureau of the Census, Washington, 25, D. C.

TABLE 1—PRODUCTION OF WOOD PULP, BY PROCESS, 1940 - 1943[1] [2]

Process	Production in tons of 2,000 pounds 1940	1941	1942	1943
All processes	8,959,559	10,375,422[2]	10,783,430[3] [4]	9,626,705[4]
Mechanical, total[2]	1,842,875	2,152,487	2,276,126[4]	2,130,302[4]
Groundwood[2]	1,578,530	1,787,712	1,756,333	1,563,960
Defibrated, exploded, asplund fiber and similar grades[2]	264,345	364,775	519,793[4]	566,342[4]
Sulphite fiber, total	2,607,789	2,918,780	2,930,272	2,436,502
Unbleached	995,700	1,215,649	1,213,066	883,306
Bleached	1,612,089	1,703,131	1,717,206	1,553,196
Sulphate fiber, total	3,747,992	4,526,611[3]	4,738,266[3]	4,235,724
Unbleached	3,163,378	3,703,502[3]	3,926,814	3,486,535
Semi-bleached	131,332	163,915	158,862	147,040
Bleached[5]	453,282	659,194	652,590	602,149
Soda fiber, bleached and unbleached[5]	532,387	479,935	462,065	418,868
Semi-chemical, off quality, screenings and miscellaneous[2]	228,516	297,609	376,701	405,309

TABLE 2—CONSUMPTION OF WOOD PULP AND OTHER FIBROUS MATERIALS IN THE PRODUCTION OF PAPER AND PAPERBOARD, BY TYPE OF MATERIAL, 1940 - 1943[1] [2]

Type of material	Consumption in tons of 2,000 pounds 1940	1941	1942	1943
All types	15,492,808	18,856,286	17,857,930[4]	18,199,442[4]
Wood pulp, total	9,781,739	11,363,600	11,038,020[4]	10,635,320[4]
Mechanical, total[2]	2,138,988	2,565,189	2,453,171[4]	2,400,142[4]
Groundwood[2]	1,862,575	2,218,808	1,926,099	1,768,016
Defibrated, exploded, asplund fiber and similar grades[2]	276,413	346,381	527,072[4]	632,126[4]
Sulphite fiber, total	2,906,794	3,348,476	3,079,227	2,891,719
Unbleached	1,348,951	1,543,146	1,581,152	1,449,419
Bleached	1,557,843	1,805,330	1,498,075	1,442,300
Sulphate fiber, total	3,964,729	4,613,905	4,632,640	4,430,098
Unbleached	3,292,130	3,710,405	3,801,610	3,583,851
Semi-bleached	178,405	207,884	164,384	163,066
Bleached	494,194	695,616	666,646	683,181
Soda fiber, bleached and unbleached	531,581	515,389	468,661	455,892
Semi-chemical, off quality, screenings and miscellaneous[2]	239,647	320,641	404,321	457,469
Fibrous materials other than wood pulp, total	5,711,069	7,492,686	6,819,910	7,564,122
Waste paper	4,667,502	6,075,129	5,494,959	6,367,854
Rags	402,600	529,976	480,614	425,910
Straw	491,821	666,493	516,087	488,266
Manila fiber and old rope	20,187	27,396	28,205	12,921
Other fiber	128,959	193,692	300,045	269,171

[1] Source: 1943 and the last nine months of 1942, Pulp Allocation Office, Forest Products Bureau, War Production Board; the first three months of 1942, and the years 1941 and 1940, Bureau of the Census.

[2] Data on the production and consumption of wood pulp have been revised to show separately information on "Defibrated, exploded, asplund fiber and similar grades" of pulp. This classification covers pulp manufactured by such recently developed pulping processes as wet refining, steam explosion and dry pressing in hammer mills. The pulps produced by these processes are used in the manufacture of high strength building papers and wall board. Data for these types of pulp were previously included in "Groundwood" and "Semi-chemical, off quality, screenings and miscellaneous" pulps, and information for the years prior to 1940 has not yet been revised on the new basis. However, these processes are recent developments in the field of pulp manufacture, and it is believed that the production of these types of pulp represented a much smaller proportion of all pulp produced in the earlier years than has been the case since 1940.

[3] Revised to exclude data for one Canadian mill formerly reported by the parent company in the United States as a United States mill.

[4] Revised in accordance with corrected reports of three mills for 1942 and 1943.

[5] The data for "Soda fiber" and "Bleached sulphate fiber" pulp have been revised in accordance with the corrected reports of one company.

Great Growth in Hydro Power

Hydro-electric power, which is the key that unlocks the forest wealth of Canada, has shown such great growth that Canada will emerge from the war with electric power production facilities 21% in excess of 1939, according to a government statement. Despite this rapid expansion, available power has lagged behind the increasing demands of industry, making restrictions necessary to assure sufficient power being available for essential war industries. However, when war production slows down more power will be available for the pulp and paper industry, as well as for commercial and domestic use generally.

It took Canada a half century to build up the power system of 8,190,000 h.p. she had in 1939, and then in the five war years 1,803,000 h.p. has been added. Canada now is believed to be the highest per capita user of electric power, with electricity providing the motive force for 80% of the Dominion's industries. More than 56% of Canada's installed power capacity is in Quebec which, despite heavy needs of its own industries, is able to export 25% of its power to Ontario. Quebec has an installed capacity of some 5,700,000 h.p. Ontario ranks second in installed capacity with 2,670,000 h.p., and British Columbia—second to Quebec in available water power resources—has 796,000 h.p. installed.

As in all industrial matters, there has been close co-operation with the United States in power supplies, with Canadian power sent across the border at Niagara Falls on occasions and United States power transmitted to Canada from Massena, N. Y. In this way the two countries have been able to meet power shortages resulting from breakdowns or other unusual conditions.

Carborundum Co. Changes

President Arthur Batts, of the Carborundum Company, of Niagara Falls, N. Y., announces the appointment of F. Jerome Tone, Jr. as vice president in charge of sales. Mr. Tone succeeds senior vice president Charles Knupfer, who has been assigned to special sales and executive activities. "Jerry" Tone, as he is popularly known, was previously vice president in charge of the Eastern sales division of the company.

Mr. Tone is widely known in industrial circles and is president of the American Supply and Machinery Manufacturers' Association.

President Batts also announces that vice president Henry P. Kirchner is to be in charge of production and Otis Hutchins has been named as technical director of the Carborundum Company in charge of research and process control and development. The appointments are effective as of September 6.

Discontinues Resale of Chemicals

Ralph B. McKinney, general manager of the Paper Makers Chemical Department of Hercules Powder Company, has announced that the Industrial Chemical Division of that department will discontinue the resale of a number of industrial chemicals made by other manufacturers. This change is being made to concentrate the department's technical service and sales force upon the products of Hercules' own manufacture.

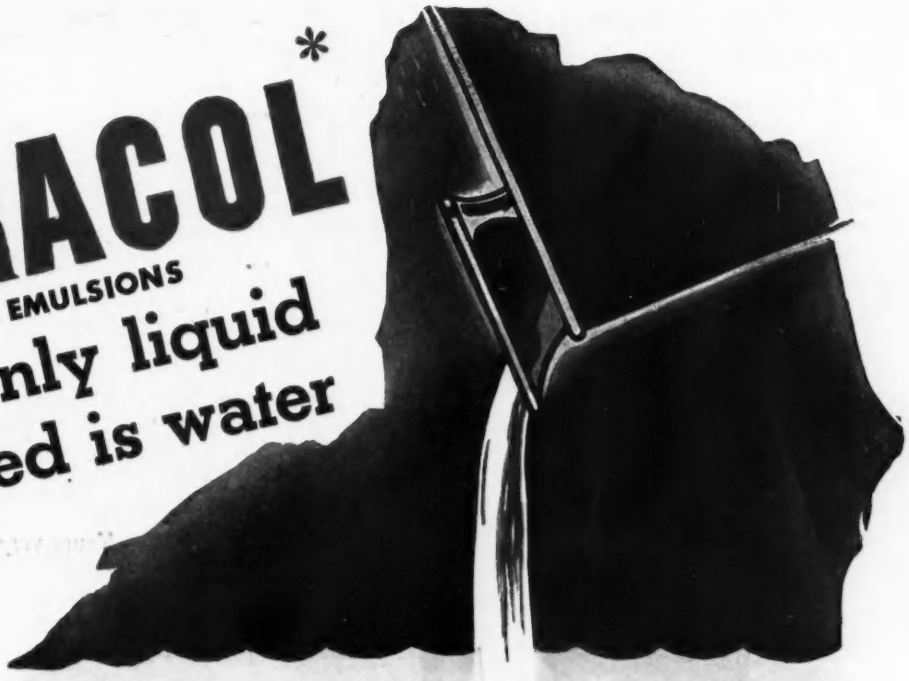
Sales representatives stationed at the local sales and distributing points have been given an opportunity to acquire for their own account the business being discontinued by the division.

This step will in no way affect the manufacture and sale of rosin size, alum, casein, and other paper chemicals which will be carried on at the same points as heretofore.

PARACOL*

WAX EMULSIONS

The only liquid needed is water



● **WHAT HAPPENS HERE?** Paracol is mixing with water like cream in your coffee—hot or cold. The wax particles of Paracol Emulsions are so microscopically small that they disperse quickly and uniformly in water solutions of papermaking materials.

The Paracol* Wax Emulsions pour or pump like water at all mill temperatures. They mix perfectly, offer trouble-free handling in beater, tub, calender or coater. Stable on long storage, they are formulated to break only where and when the wax is needed . . . in the presence of acid or alkali or heat. It's easy to use Paracol whenever paper needs wax.

Your PMC technical representative knows how to obtain the best results with Paracol—through our more than 15 years experience in making emulsions and applying them to papermaking problems. For further information on the use of Paracol emulsions in your operations, use the convenient coupon below.

HERCULES

CHEMICALS FOR INDUSTRY

*Reg. U. S. Pat. Off. PMC by Hercules Powder Company

HERCULES POWDER COMPANY
INCORPORATED
Paper Makers Chemical Department
9[illegible] King Street
Wilmington 99, Delaware

Gentlemen:

My wax problem is.....

Please send me information on.....

Name.....Title.....

Firm.....

Address..... PI-44

Lt. Peter L. MacNaughton Injured

Lt. Peter L. MacNaughton is in the McCloskey General Hospital, Temple, Texas recovering from injuries sustained in an aircraft accident while making a flight alone near Waco, Texas, where he has been stationed as aviation instructor and assistant engineering officer.

LT. PETER L. MACNAUGHTON

While his escape from death was by a close margin, his injuries are relatively minor, consisting mainly of a fractured jaw, besides cuts and bruises which will keep him in the hospital for a few weeks.

Lt. MacNaughton is the younger son of W. G. MacNaughton, News Print Service Bureau and before he entered in the Air Corps worked at the Panama City Mill of International Paper Company.

Post-War Cooperation

Cincinnati, Ohio, September 18, 1944

EDITOR PAPER TRADE JOURNAL:

Mr. Levin's letter to the editor, in the issue of September 7, dealing with the chaotic conditions in the industry before the war, raises a question which deserves careful consideration. Being fundamentally an optimist, I have considerable confidence in the future of the paper industry. However, the extent of its prosperity will be determined by the foresight of those who influence its post-war development.

A product finds a market because it best serves a particular purpose or because it is more economical. A large percentage of paper production falls into the first category and is thereby protected. Another large segment may eliminate itself in the post-war period by an inability to compete with new items produced more cheaply.

The intelligent unionization of the industry on a national and industrial basis would go a long way towards bringing the industry out of chaos by stabilizing labor costs. Such unionization, I assure you, is coming. It will be a definite advantage to the efficient operator and remove one of the major factors of cut-throat competition. Stabilization of the industry is a necessity and something the manufacturers alone have evidently never been able to bring about.

The reduction of costs by mechanical and technical innovations is also a necessity. In the post-war period, paper manufacturers will have to install modern machinery, develop new processes, invent new products and improve quality, eliminate unnecessary overheads, and most important, exchange the so-called "trade secrets" which only serve to restrain progress and enable competing products to replace paper. If paper is to retain its place in the economy, cooperation within the industry is essential.

A huge reservoir of ideas and suggestions, hitherto untapped, lies in the ranks of the employees of the industry. The only way of getting to this untapped reservoir is by labor-management cooperation. Prosperity of the industry will obviously benefit the workers.

In closing, let me mention that considerable economies can be effected if all paper manufacturers would realize that unionization is inevitable and that dividends can be derived from cooperation. Opposition can only bring short term delays and grief on both sides.

Yours very truly,

HARRY SAYRE, Sec.-Treas.
Paper Workers Organizing Committee CIO

Three Paper Companies Get Awards

SPRINGFIELD, Mass., October 2, 1944 — With a record of seven and a half years—1,777,000 man hours—without a lost-time accident in its Woronoco N. 1 Mill, the Strathmore Paper Company received an award for excellence from Liberty Mutual Insurance Company at a conference here of 375 Western Massachusetts business and industrial leaders.

A flag was presented to George E. Williamson, vice-president and treasurer of the company, by S. Bruce Black, president of Liberty Mutual Insurance Company.

Mr. Black also presented safety flags to the Old Colony Envelope Company, represented by J. A. Chadburne, Jr., treasurer, and the United States Envelope Company, represented by Willard E. Swift, president.

The conference was called by the insurance company to discuss with employers the latest developments in the conservation of manpower through industrial medical hygiene, rehabilitation of injured workers and reemployment of the physically handicapped. Operation of Liberty Mutual's Rehabilitation Center in Boston, where, through physical, occupational and recreational therapy, men and women who were injured in industrial accidents are rehabilitated so they can return to their jobs.

Empire State Paper Men Meet

The Empire State Paper Association held an all day meeting at the Fort Orange Club in Albany on Thursday, September 21. In addition to the business meeting and the Wrapping and Fine Paper group discussions, many aspects of Government activities in the paper field were covered by W. G. Leathers of the National Paper Trade Association.

At lunch, guests Joseph MacLaren of the War Production Board in Washington and George O'Conner, president of Mohawk Paper Mills, gave highly interesting talks on the paper situation as seen by the Government and the manufacturer, respectively.

LOOKING AHEAD?

Of course you are. You're looking ahead to Victory Day... looking beyond that to the peace which will follow... planning now to take full advantage of your post-war opportunities.

We're ready to work with you in developing any new uses for starches which are part of your post-war plans.

Stein-Hall Paper Laboratories and Technical Field Staff are backed by 78 years of experience in developing and supplying high quality starches, gums and dextrines for sizing, calendering, coating and adhesive purposes.

That experience is at your service—and at no obligation to you.

So count us in on your post-war plans. Whatever your problem, share it with us . . . we'll work it out together.

78 YEARS OF STARCH SERVICE

STEIN SH HALL

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EST. 1866

LABORATORIES AT NEW YORK
CHICAGO • CHARLOTTE • PROVIDENCE
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FOUNDERS—STEIN • HALL RESEARCH FELLOWSHIP AT THE INSTITUTE OF PAPER CHEMISTRY, APPLETON, WIS.

Garrett-Buchanan Co. Enlarges

To its already large capacity, the Garrett-Buchanan Company of Philadelphia, Baltimore, Md., Reading, Pa., and Lancaster, Pa. has just acquired another 53,976 square feet of floor space. The company's new address in Philadelphia will be 12 to 26 South Sixth. This well known paper company has purchased the John B. Ellison Building, which is adjacent to its present location containing five floors and a basement. The additional space will permit greatly enlarged stocks, Sales offices and show rooms which will enable it to take full advantage of the many post-war opportunities. The company, aside from its branches, has a warehouse in Philadelphia located at 8th and Willow streets.

NEW HOME OF GARRETT-BUCHANAN CO.

D. D. Davis Made Exec. Vice Pres.

MINNEAPOLIS, Minn., October 4, 1944—The Minnesota and Ontario Paper Company announces the election of Donald D. Davis to the office of executive vice president. Mr. Davis plans to assume his duties on or about November 1. Mr. Davis has served for the past two years as vice chairman of the War Production Board in Washington, D. C., and was formerly president of General Mills, Inc.

It is expected that at the next annual meeting in May, 1945, Mr. Davis will be elected president of Minnesota and Ontario Paper Company and of its subsidiaries to succeed R. H. M. Robinson, who has served as president since the reorganization of the company on March 1, 1941; and at that time Mr. Robinson will become chairman of the board.

Mr. Davis was born in Wyoming, Ill., in 1888. He spent his early childhood in Kewanee, Ill., and received his grade and high school education there and in Glendora, Cal. He spent four years at the University of Michigan, studying engineering.

He was chief engineer of the Hayes Wheel Company, Jackson, Michigan, for a year, and in 1912 joined the engineering staff of Suffern & Sons, New York. The next year he went to the Detroit Trust Company, to conduct accounting, production and engineering activities.

In 1915 he became factory manager of Hale & Kilbourne, Philadelphia, and in 1916 undertook production supervision for Hart-Parr Company, Charles City, Iowa.

After a short term as executive secretary of the milling division, United States Food Administration, in 1917 he joined the U. S. Army Air Service, serving as a major until after the World War. In 1919 he became manager of the industrial department of the Liberty National Bank and the New York Trust Company, New York.

In 1922 he was made secretary of Washburn Crosby Company, Minneapolis, and was successively secretary and treasurer of the company, until being named vice president and treasurer of General Mills, Inc., in 1928 on its formation. In 1934 he was elected president of General Mills, holding that office until December 1942, when he resigned to become vice chairman of the War Production Board.

Seamless Tube Data Book

This new book on tubing is divided into four principal sections, with guide index, covering General Data—Mechanical Tubing—Pressure Tubing—and Reference Tables.

Under General Data—there is a brief summary on the history, manufacture, tests, special shapes and standard steels with chemical composition, mill practices, etc.

The section on Mechanical Tubing covers information on typical uses, suggestions of how to obtain best results through the use of tubing, determining proper size, with complete tolerance tables, properties for beams, and a digest of standard specifications.

The section on Pressure Tubing covers various pressure formulae, specifications and tolerance tables for boiler tubes, heat exchanger and condenser tubing, still tubes, alloy steel pipe, stainless steel analyses, with metallurgical data.

The Reference Table section is unusually extensive with many formulae, weight tables for rounds, squares, rectangles, surface areas both inside and outside, and other tables commonly found useful in tubing applications.

This is the most complete volume on this subject issued for many years. Supplementary sheets with new data will be supplied from time to time.

The book is issued by the Seamless Steel Tube Institute, Pittsburgh 19, Pa. It contains 320 pages with loose-leaf binder, page size 8½ x 11 inches, and sells for $2.50.

RCI Announces Promotions

John J. Bradley, Jr., director in charge of research for Reichhold Chemicals, Inc., announces that the men named below were promoted to the positions indicated on September 1.

Arthur C. Lansing, manager of research and assistant to Mr. Bradley; P. Stanley Hewett, director of research, chemicals division; C. John Meeske, director of research, coating resins division; Clinton A. Braidwood, assistant director of research, coating resins division.

As is known throughout the paint, printing ink, plastics, paper and textile industries, the RCI Research Department has attained many notable achievements during the war. And the program adopted by these newly appointed department heads promises many more advancements for the peacetime era.

DEDICATED TO RESEARCH

DURING the first week of October, this doorway to the Whitemarsh Research Laboratories officially opened, and the new home of Penn Salt's Research and Development Department was formally dedicated.

Here will be continued the important work of Penn Salt's rapidly growing staff of chemists, engineers and other technologists. With greatly enlarged facilities, they will be well-equipped to bear a substantial share of the increased responsibility imposed on industry by wartime's fast changing economy. Materials, not even dreamed of yesterday, already have become commonplace. And still more remarkable things are in store for the world of tomorrow.

This great building symbolizes the transformation that is taking place in the field of practical research.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
1850 *Chemicals* 1944

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Cincinnati • Minneapolis • Wyandotte • Tacoma

FORWARD TO A BETTER FUTURE WITH RESEARCH

Penn Salt products enter into the manufacture of chemicals for agriculture, water and sewage, metal industries, ceramics, glass, oil refining, pulp and paper, textiles, leathers, laundry and dry cleaning, aviation gasoline.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending September 30, 1944

STOCKS

	High	Low	Last
A. P. W.	4⅛	3¾	3¾
Armstrong Cork Co.	45	44⅛	45
Celotex Corp.	14½	13½	14⅜
Celotex Corp., pf.	18¾	18½	18¾
Certain-Teed Products Corp.	7⅛	6½	6¾
Certain-Teed Products Corp., pf.	115½	106	113⅜
Champion Paper & Fibre Co.	28¾	28	28⅜
Champion Paper & Fibre Co., pf.	...	...	...
Congoleum Nairn Co.	26½	26¼	26½
Container Corp. of America	26½	26	26½
Continental-Diamond Fibre Co.	11⅛	10⅝	11
Crown-Zellerbach Co.	19⅜	18⅞	19⅛
Crown-Zellerbach Co., pf.	102½	102⅛	102⅛
Dixie Cup Co.	20⅛	20⅛	20⅛
Dixie Cup Co., —A.	47½	47	47½
Flintkote Co.	22¾	22¼	22⅜
Flintkote Co., pf.	...	...	...
Robert Gair	4¾	4½	4⅝
Robert Gair, pf.	15¼	15	15⅛
International Paper Co.	19⅞	18⅞	19
International Paper Co., pf.	84⅜	83	84½
Johns Manville Corp.	98½	97½	98
Johns-Manville Corp., pf.	...	...	...
Kimberly Clark Corp.	41¼	40	41¼
MacAndrews & Forbes	29¾	29¼	29¼
MacAndrews & Forbes, pf.	139	138	139
Masonite Corp.	44	43¼	43¼
Mead Corp.	12⅜	12	12
Mead Corp., pf. A—6%	99	99	99
Mead Corp., pf. B—5½%	93¾	88½	93¾
National Container Corp.	10⅝	10⅛	10½
Paraffine Companies, Inc.	54	53	53
Paraffine Companies, Inc., pf.	...	...	...
Rayonier, Inc.	17⅜	16⅞	16⅞
Rayonier, Inc., pf.	32¾	32¼	32¾
Ruberoid Co.	34	33½	34
Scott Paper Co.	42½	42⅜	42½
Scott Paper Co., pf.	113	113	113
Sutherland Paper Co.	30	30	30
Union Bag & Paper Corp.	14	13⅝	13⅝
United Paperboard Co.	7⅛	6⅝	6⅞
U. S. Gypsum Co.	79¼	78	79¼
U. S. Gypsum Co., pf.	...	...	...
West Virginia Pulp & Paper Co.	24¼	23½	24¼
West Virginia Pulp & Paper Co., pf.	107	107	107

BONDS

Abitibi Pulp & Paper Co. 5s '53	89	86½	87½
Celotex Corp. 3¾s '55	103½	103½	103½
Certain-Teed Products Corp. 5½s '48	...	...	...
Champion Paper & Fibre Co. 4½s '50	...	...	...
International Paper Co. 6s '55	109½	108⅞	108⅞
International Paper Co. 5s '47	104	103¾	104
Mead Corp. 3½s '53	...	...	...
West Virginia Pulp & Paper Co. 3s '54	...	...	...

New York Curb Exchange

High, Low and Last for Week Ending September 30, 1944

STOCKS

	High	Low	Last
Great Northern Paper Co.	35⅝	35⅛	35⅛
Hummel-Ross Fibre Corp.	7⅞	7⅝	7¾
St. Regis Paper Co.	6⅛	5⅞	6
St. Regis Paper Co., pf.	...	...	...
Taggart Corp.	6	6	6

BONDS

American Writing Paper Co. 6s '61	101½	100¾	101½

Champion Nets 73 Cents

The Champion Paper and Fibre Company and subsidiaries for the sixteen weeks to August 20, reports net profit, after $1,650,000 taxes, was $611,435, or 73 cents a common share, against $664,334, or 91 cents a share, after $1,480,624 taxes, last year.

Harris-Seybold-Potter Nets $1.04

The Harris-Seybold-Potter Company for the year to June 30, reports a net income of $229,601, for $1.04 a common share, against $306,669, or $1.64 a common share for preceding fiscal year.

Container Corp. Votes Dividend

The Container Corporation of America has declared a dividend of 75 cents, payable November 20 to stockholders of record November 4. Previous payment was 25 cents on August 21.

Mersey Paper Co. Has Improved Year

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., September 25, 1944 — The consolidated statement of the Mersey Paper Company, Ltd., of Liverpool, N. S., for the year ending December 31, 1943, shows an expansion of almost 50% in operating profits as compared with the previous year; a net profit, after all charges and write-up equal to $2.60 a share on outstanding preferred stock as against a net deficit for the year before; and a material improvement in net working capital and in cash position gross profit, after depletion, was $1,105,420, compared with $787,876 in 1942. After increased depreciation and provision for taxes, as well as a write-off of a proportion of bond discount and expense, there was a net profit of $131,286, equal to $2.62 per share on 50,000 shares of 5½% preferred stock on which there is an accumulation of dividend arrears.

In 1942, after providing for interest charges the entire balance was transferred to reserve for depreciation, and a write-off of proportion of bond discount was deducted from surplus.

Consolidated balance sheet reveals a substantial increase in working capital. Current assets, including Dominion Government bonds, amounted to $3,932,909 at the close of 1943 against $3,272,552 at the end of 1942. Current liabilities were $694,840 against $708,249. On this basis, net working capital was $3,238,069 against $2,564,303, an increase of $674,000.

The balance sheet shows an increase of $450,000 in holdings of Dominion Government bonds, from $300,000 to $750,000. It also shows a reduction of $133,000 in funded debt. Cash increased sharply, from $87,332 to $625,435, while accounts receivable were reduced over $300,000 to $887,228. Inventories were maintained at nearly the same level as the previous year.

Nekoosa-Edwards Declare Dividend

Directors of the Nekoosa-Edwards Paper Company have declared a dividend of 50 cents per share on the capital stock, payable to stockholders of record as of September 20. Checks were to be mailed by September 30. This is the third quarterly dividend to be paid by the company in 1944.

Celotex Earns 6 Cents

The Celotex Corporation reports a consolidated net profit for the third quarter, ended July 31, of $85,476, equal to 6 cents a share of the common stock. Earnings for the preceding six months were $209,093, or 17 cents a share, the report said. Net for the full nine months was $294,569, or 23 cents a share.

Mosinee Profits Up

The Mosinee Paper Mills for the year to May 31, reports a net income of $184,507, or 90 cents a common share, against $176,575, or 86 cents a common share for previous year; net sales, $4,002,550, against $3,461,931.

Albermarle Earns $57,753

The Albemarle Paper Manufacturing Company for the quarter to June 30, reports a net income of $57,753, contrasted with net loss of $6,262 a year before; net sales, $1,294,912, against $1,025,235.

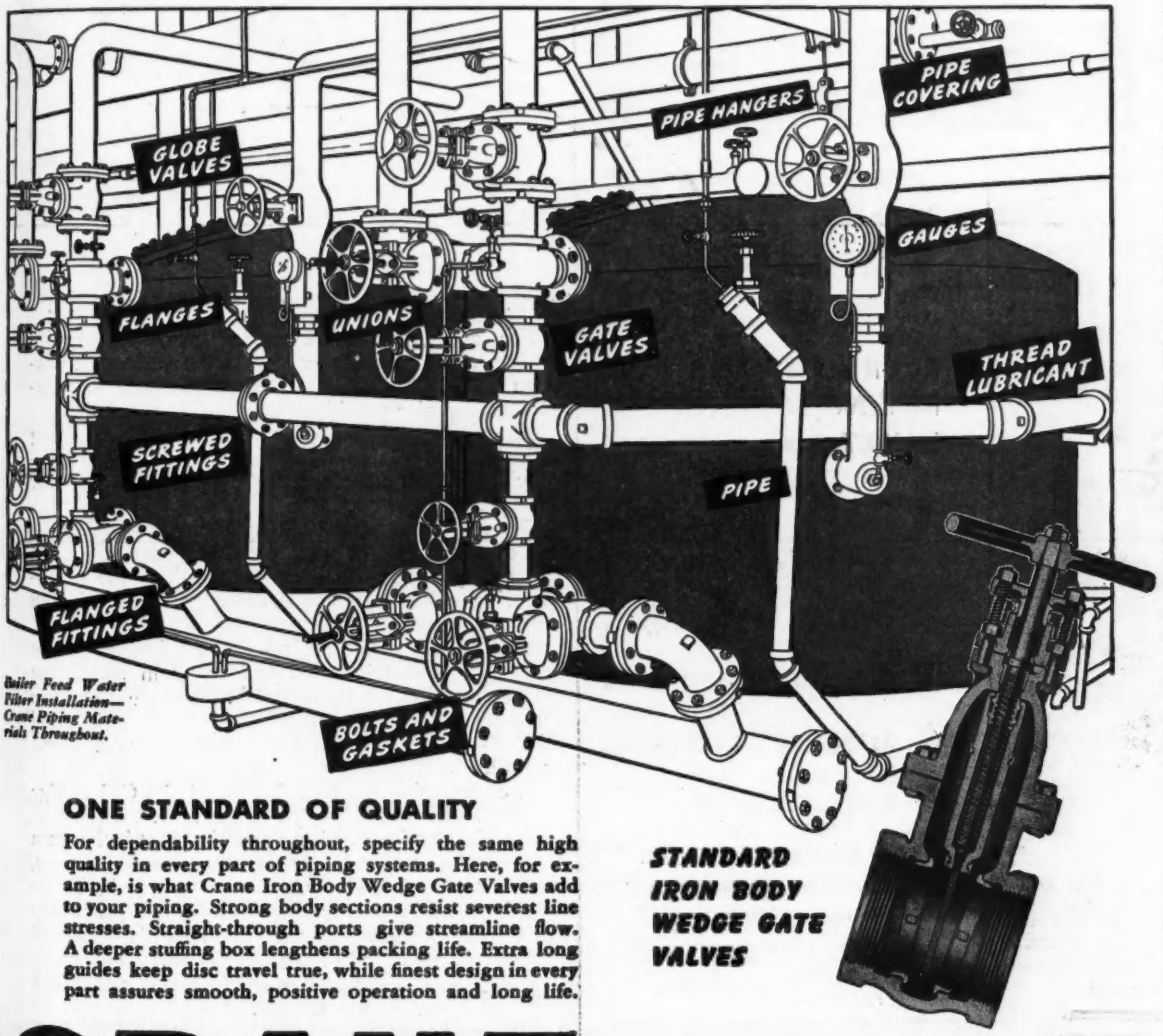
You name the Piping Service CRANE supplies the Equipment

ONE SOURCE OF SUPPLY . . . ONE RESPONSIBILITY FOR ALL MATERIALS

Valves—fittings—pipe—fabricated assemblies—and piping accessories—for power or processing lines—high, moderate, or low pressure—all your needs for any installation are available from a single source: Crane. Just name the fluid to be handled—your Crane Branch offers the world's greatest selection of quality materials—in brass, iron and steel—for every piping service.

Better installations start with parts whose quality and craftsmanship are backed by a single responsibility. Ordering, maintenance work, storing of parts and getting emergency replacements—all such steps are simplified by Crane *complete* materials service. Your satisfaction with Crane products is assured by Crane Co.'s 89-year experience and leadership in the piping equipment field.

CRANE CO., General Offices: 836 South Michigan Avenue, Chicago 5, Illinois. *Branches and Wholesalers Serving All Industrial Areas.*



Boiler Feed Water Filter Installation—Crane Piping Materials Throughout.

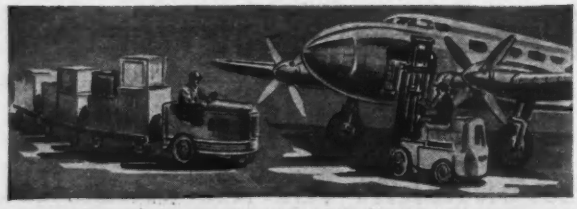
ONE STANDARD OF QUALITY

For dependability throughout, specify the same high quality in every part of piping systems. Here, for example, is what Crane Iron Body Wedge Gate Valves add to your piping. Strong body sections resist severest line stresses. Straight-through ports give streamline flow. A deeper stuffing box lengthens packing life. Extra long guides keep disc travel true, while finest design in every part assures smooth, positive operation and long life.

STANDARD IRON BODY WEDGE GATE VALVES

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS



CLARK FORK TRUCKS

FIVE REASONS FOR BUYING FORK TRUCKS BUILT BY...CLARK

1 Move materials faster.

2 Relieve congestion.

3 Multiply manpower.

4 Simplify Planning.

5 Save money.

Clark Tructractor builds industrial haulage vehicles for every material handling operation.

Another PRODUCT of CLARK EQUIPMENT COMPANY

Write for New Vest Pocket Catalog

CLARK TRUCTRACTOR

DIVISION OF CLARK EQUIPMENT COMPANY

BATTLE CREEK, MICHIGAN, U.S.A.

F. T. Webb Elected Secretary

F. T. Webb has been elected secretary of Bates Valve Bag Company Ltd., the Canadian subsidiary

F. T. Webb

of St. Regis Paper Company. Mr. Webb was with the Investment Department of the Sun Life Assurance Company of Canada for nineteen years and was their Pulp and Paper security specialist.

W. Ralston Co. Expands at Old Bridge

The acquisition of extensive property at Old Bridge, N. J., as a major step in the expansion program of W. Ralston Company, Inc., has been announced by vice president George W. Chadwick.

Remodeling of six present structures is being rushed to completion in order to increase the company's facilities now overtaxed by war orders for waterproof paper products.

Covering 45 acres and having approximately 70,000 feet of floor space in the present buildings, the plant will be equipped with complete facilities for manufacturing all grades of Duplex, Reinforced and Saturated papers.

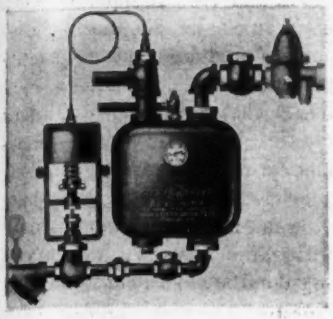
A laminating machine, one of the largest in the country, is being installed and this will enable the production of paper up to 108 inches wide. Complete sheeting and slitting equipment is being installed, and this plant will feature a hand-made bag department as well.

In commenting on the selection of the Old Bridge site, Mr. Chadwick had this to say: "While most of our production here and at the main plant in Niagara Falls will be on war orders for some months to come, the nearness of Old Bridge to New York, Philadelphia, Reading, Jersey City, Newark and practically all of the major markets of the Atlantic Seaboard will put us in an ideal position to serve our many peacetime customers in this area by rail, water and highway when the war is over."

"We are happy to announce also that B. U. Wright, sales manager, will be in charge of sales for both the Niagara Falls and Old Bridge divisions with headquarters at our New York Sales Office at 200 East 42 street, New York City."

Steam Mixer Water Heater

Compact and easy to install, the new O'Brien steam mixer water heater made by the O'Brien Steam Specialty Company, Dept. 64, 205 Harrison Street, Syracuse, 2, N. Y., is a complete packaged unit, including heater, temperature regulator, temperature-pressure relief valve, thermometer and, where necessary or desired, water presure regulator and steam and water pressure gauges.



Employing a new muffler-diffuser type mixing nozzle, the O'Brien heater is efficient and quiet. Not only is all the heat of the steam delivered to the water, but the condensate itself is utilized as hot water. There is no waste of condensate, and no condensation return system is required. The unit is designed for steam pressures of 50 to 150 pounds.

The O'Brien steam mixer water heater can be easily installed near the point of use to deliver an adequate supply of hot water at controlled temperatures. Steam pipe sizes range from ½ to 1½ inches, with capacities ranging up to 550 G.P.H. There is also a wide selection of temperature ranges available, making the unit practical as either a primary or booster heater.

While copper alloys remain on the critical list, the mixer body is being supplied in close-grained iron. When conditions again permit, the body will be cast bronze similar to previous models which have been on the market since 1940.

Issues Order M-93 on Wood Pulp

The War Production Board issued on September 28, 1944, General Preference Order M-93 (wood pulp) in a revised form, incorporating various corrections and amendments made from time to time, but without making substantive changes. This order makes deliveries and consumption of wood pulp subject to WPB authorization.

Simultaneously, Direction 1 of this order was amended by adding certain grades of paper and paperboard, which are given preferred production status, and deleting certain other grades, which no longer have preferred status.

Preferred production status was established by WPB to insure the manufacture and delivery of certain types and grades of essential paper and paperboard to meet military and civilian requirements, it was explained.

The grades added follow: Chemical and rag mimeograph, liquid tight container stock, cup lid stock, ice cream and frozen food container stock, and butter carton stock.

The items deleted included: Rag wet strength map paper, other rag content and chemical reproduction paper, and waxing tissue.

TRADE MARK

Trinity Bag & Paper Co., Inc.

25 WEST 43rd STREET • NEW YORK 18, N. Y.

Mill Agents and Distributors

PAPER BAGS AND SACKS
All Types and Styles
Self-Opening, Square
Flat and Sacks

WRAPPING PAPERS
Kraft—Bleached and Unbleached
Butchers—Dry and Water Finish
M. G. Papers—Bleached and Unbleached

WRITINGS
Bonds and Ledgers
Index

OTHER GRADES
Envelope, Offset and Printing
Gumming—Bleached and Unbleached
Kraft Specialties of all Descriptions — both Bleached and Unbleached

Agents for:

FLORIDA PULP & PAPER CO., PENSACOLA, FLA. • SANTA ROSA PULP & PAPER CO., PENSACOLA, FLA.

BAG PLANTS AT MOBILE, ALABAMA, AND MONROE, LA.

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger, Editor

COMING EVENTS IN PAPER INDUSTRY

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

Chicago Professional Paper Group—First Monday of each month except July and August at Chicago, Ill.

PULPWOOD

Cooperation of all concerned in the harvesting of more pulpwood to meet the current very heavy demand, has been praiseworthy in response to considerable well directed publicity. The very good wood supply situation is indicated in the present statistical position. Total U. S. receipts for the first seven months of 1944 were 9,709,000 cords, an increase of 21.7%, compared with 7,977,000 cords in 1943 and with 10,261,000 cords in 1942. Inventories for the above stated period totaled 3,113,000 cords in 1944, an increase of 25.6%, compared with 2,480,000 cords in 1943, and with 3,668,000 cords in 1942. Consumption aggregated 9,300,000 cords in the seven month period in 1944, an increase of 5.8%, compared with 8,788,000 cords in 1943, and with 10,263,000 cords in 1942.

In its analysis of the above figures, the Department of Commerce in its excellent report, indicates that receipts in the Lake States increased 73.2%; in the Appalachian region, 38.9%; in the South 15.5%; in the Pacific Northwest, 15.1%, and in the Northeast area, 2.5 %. Consumption of pulpwood was greatest in the South, with 14.6%, in the Pacific Northwest, 8.6%; in the Northeast, 6.5% and in the Lake States, 2.8%. Consumption declined 6.5% in the Northeast and 0.9% in the Appalachian area. Inventories were highest in the South with an increase in the seven month period of 1944, over 1943, of 151.9%; Appalachian, 56.6%; Lake, 29.2%; Pacific Northwest, 46.9% and declined 15.0% in the Northeast.

In its current review of the pulpwood supply situation the Department report states that, although the pulpwood logging labor situation is still critical, some improvement is in evidence in most sections of the country, brought about by more manpower in the woods and in the mills. However, the shortage of heavy duty truck tires threatens to hamper the necessary truck movement of pulpwood from the forests to the mills. There seems to be little prospect of immediate relief, nor are the prospects too bright for the next few months. The favorable upward trend brought July receipts about 3% over June 1944 and 11% above July 1943. Receipts for August 1944, including imports, aggregated approximately 1,705,000 cords: domestic 1,502,000 cords, which is about 17% above August 1942 and 1943 receipts of wood. However, WPB said, in future months much greater effort must be expended to produce a greater quantity and a much higher percentage of long fibered species, such as spruce and fir. That agency also indicated that adequate inventories of broad-leaved species cannot be utilized unless a higher percentage of long fibered wood is available. Efforts to increase pulpwood production in the fall and winter months must be directed to producing the necessary amounts of spruce and fir. During the first eight months of 1944, mill receipts of domestic pulpwood totaled about 10,328,000 cords. This amount is 24% above that of the corresponding period a year ago and approximately the same as in 1942.

In its latest release week the War production Board said that domestic receipts in the Northeast region were about 6% above August 1943, but only about one per cent above those of 1942. Increased production of pulpwood by farmers accounted for a substantial portion of the increase. Imports of Canadian pulpwood in the Northeast region were reported 13% less than in August 1943. This decline in Canadian wood brought total receipts for this region down below those of 1943 by approximately 2%. Inventories in the Northeast region, according to WPB officials, are about 15% below those of August 1943 and, with receipts still falling below those of 1943, a critical production problem continues to exist. August receipts in the Appalachian region were 6% above a year ago. However, with the peeling season ended in August, it was noted that the amounts of peeled wood produced will not meet the requirements for peeled wood in this region. Pulpwood receipts for August 1944 in the South were about 23% above those of August 1943. However, the WPB stated, even with a high level of receipts at the mills, the shortage of labor and mechanical facilities in the mill yards of some of the southern pulp mills have created pulp production problems. August receipts in the Lake States were up 37% in August above last year but receipts were only one per cent above 1942. Inventories were up 28% above last year, but this region was in a poor inventory position last year. The Pacific Northwest experienced fine logging weather in August, the report went on to say, and receipts were about 6% above those of 1943. However, hot, dry, "fire" weather was experienced in early September and logging operations had to be curtailed and suspended for periods of time in some areas. The future prospects of even maintaining the present level of receipts in the critical Pacific Northwest area were said to depend on whether or not the minimum requirements for heavy-duty tires for maintenance of trucks now operating in the logging industry in this area can be met.

The Department of Commerce reports that the total number of war prisoners cutting pulpwood is still about 7,000, but plans are under way to open 10 more camps in the South, in the area east of the Mississippi to North Carolina, which would use about 2,500 prisoners of war in all. Of the total receipts of pulpwood cut in the South, about 17% has been done by prisoners of war. During July 1944, prisoners of war throughout the United States actually worked approximately 201,000 man-days in forestry and logging work for private employers. Of this total, about 90% of the work performed was in pulpwood cutting and nearly one-half of all the work was performed in Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.

No Cut-Backs in Pulpwood Industry

All the talk about reconversion of war industries and cut-backs in employment and war orders after V-Day needn't bother pulpwood cutters or the men and women working in pulp and paper mills, states the War Activities Committee of the Pulpwood Consuming Industries. The pulp and paper industry is America's sixth largest industry. It was here before the war and it will be here after the war

Accumulated civilian needs for paper alone will keep the industry operating full scale for a long time after war orders stop. New uses for pulpwood, including the substitution of paper and paperboard for many other packaging materials, will open great post-war markets for this now vital war material.

The war isn't over yet by any means. So it certainly is no time to let up. But pulpwood cutters, as well as pulpwood mill workers, do have the comforting assurance that they will be needed in peace-time as well as wartime. They should have no worries about post-war security.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1944		Corresponding Weeks—1943	
August 19	91.3	August 21	90.9
August 26	93.2	August 28	91.2
Sept. 2	92.8	Sept. 4	90.7
Sept. 9 (Holiday Sept. 4)	76.8	Sept. 11	74.6
Sept. 16	94.8	Sept. 18	92.2
Sept. 23	93.7	Sept. 25	92.2

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1943	87.2	88.9	89.5	88.7	91.4	84.8	84.3	91.0	88.3	89.6	89.6	82.0	87.8
1944	89.6	89.6	89.2	88.8	89.7	90.7	81.7	*92.5*					

COMPARATIVE YEARLY SUMMARIES

	1937	1938	1939	1940	1941	1942	1943	1944
Year to Date	86.1	69.4	79.5	86.2	95.0	92.2	88.1	89.5
Year Average	79.8	71.5	83.4	85.6	97.4	90.4	87.8	

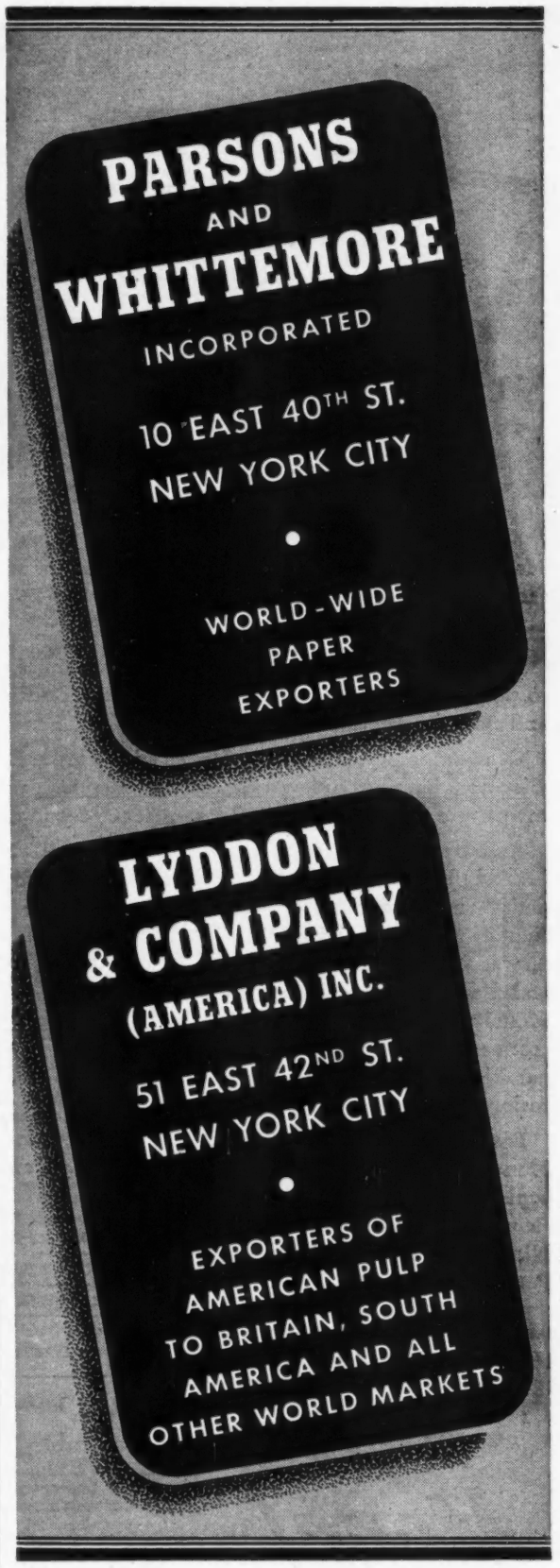
*Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

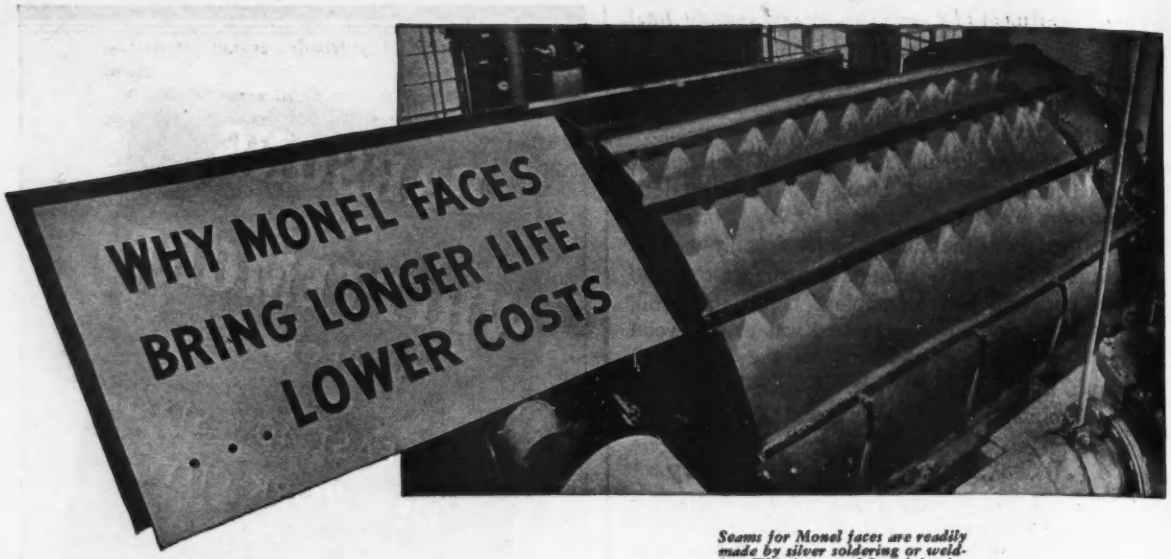
PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1938	56	63	63	60	60	59	59	69	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	83	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	88	94	94	96	94	89	96	94	94	93	87	93
1944	90	96	95	96	96	96	85	*96*					

Week ending Aug. 19, 1944—95
Week ending Aug. 26, 1944—96
Week ending Sept. 2, 1944—97
Week ending Sept. 9, 1944—80
Week ending Sept. 16, 1944—97
Week ending Sept. 23, 1944—96

†Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.





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For further information on Monel wire cloth, write for your copies of ***Performance and the Reasons*** and Bulletin C-3, ***Monel, Nickel and Inconel in Pulp and Paper Mills.***

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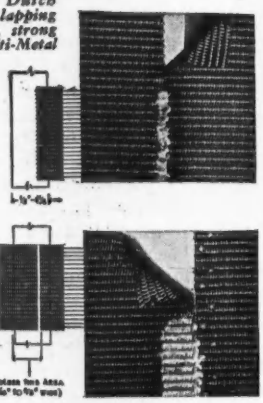
Seams for Monel faces are readily made by silver soldering or welding. This improved butt joint for corduroy and twilled Dutch weaves eliminates over-lapping and produces a smooth, strong seam. Developed by Multi-Metal Wire Cloth Co.



1 ¾" x .014" Monel strip spotwelded to under side of one end. ½" to project.

2 Bring cover around to close fitting butt joint. Solder cloth to Monel strip and over butt joint.

ESTABLISHED TYPES OF MONEL WIRE CLOTHS for PULP and PAPER MILL SERVICES		
Pulp Thickeners	***Monel Backing Screens***	***Monel Top Screens***
VACUUM FILTERS	10, 12, 14 mesh*	40, 50, 60 mesh
SAVE-ALLS	10, 12, 14 mesh*	50, 60, 70, 80 mesh (12 x 64 corduroy cloth used without backing screen)
Unbleached Stock Washers		
VACUUM FILTERS	10, 12, 14 mesh*	30, 40, 50, 60 mesh
DECKERS AND CYLINDERS	12 x 64 mesh Monel and 14 x 88 mesh Monel corduroy cloth used without backing screen	
Alkaline Bleached Stock Washers*		
VACUUM FILTERS	10, 14 mesh*	40, 50 mesh
BOARD MACHINE CYLINDERS	10, 12, 14 mesh	30, 40, 50, 60 mesh
BEATER WASHER		40, 50, 60 mesh
Lime Sludge Filters		
VACUUM TYPE	14 x 100 mesh Monel, 24 x 110 mesh Monel, 200 twilled Dutch weave Monel and "AU-Type" extra heavy braided weave Monel filter cloth	
Water Filters		
CYLINDER AND VACUUM TYPE	12 x 64 mesh Monel, 14 x 88 mesh Monel 80 mesh twilled Monel (wire dia. 0.007") 100 mesh twilled Monel (wire dia. 0.005") 120 mesh twilled Monel (wire dia. 0.004") 120 x 140 mesh twilled Monel (wire dia. 0.004")	
CLAY AND COLOR STRAINERS	150, 200 and 325 mesh Monel	

*10 mesh recommended for increased open area and drainage— **For chlorinated, acid-bleached stock washers Type 316 nickel-chromium-molybdenum alloy steel recommended.

This classification table is offered for your guidance through the courtesy of the Multi-Metal Wire Cloth Company, N. Y. *Write us for copies.*

Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY
122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

The Introduction of Additional Sulphur Into Alkaline Cooking Liquors by Means Of Sodium Sulphite*

By Sidney D. Wells[1]

Abstract

The replacement of somewhat less than half of the sodium sulphide in typical kraft cooking liquor with slightly more than the equivalent amount of sodium sulphite makes possible the production of typical kraft pulps from pine with an increase in the severity of the cooking conditions by increasing the duration of cook or the temperature of cooking by small amounts.

The cost of the make-up chemical using sodium sulphite instead of salt cake is very little, if any, more and the gain in heat recovery is greater by the amount of the heat of combustion of the sulphur used in forming the sodium sulphite and because of the saving of the heat of reduction of the salt cake, which would not be necessary.

Mills confronted with litigation or complaint on account of odor would reduce the nuisance by the use of the sodium sulphite-sodium sulphide combination.

Use of the combination in impregnation-injection cooking would offer a convenient method for the introduction of the small amount of sulphur required in the cooking and recovery systems.

The presence of sulphur compounds of a reducing nature, such as sodium sulphide, sodium sulphite and, to some extent, the polysulphides and hydrosulphides, has long been recognized as beneficial in the alkaline pulping of wood and other fibrous vegetable material. The kraft pulp industry is the outstanding realization of these benefits. Many soda pulp manufacturers are interested in the possibility of introducing sulphur into their system without extensive alterations of or additions to existing equipment. Furthermore, the recovery of soda in many modern kraft mills has become so efficient that the make-up soda required in the form of salt cake is not sufficient to supply, upon reduction in the smelters, the amount of sodium sulphide required to maintain the desired ratio of sodium sulphide to caustic soda in the cooking liquors. Additional sulphur must be introduced into the system.

In many mills the sulphur is added in elemental form to the black ash entering the smelters, whereas in others it is added to the black liquor entering the incinerator. Many soda pulp mills add it to the digesters with the chip charge.

In the first two methods, much of the sulphur so added is lost in the flue gases and in the last practice a large portion combines with the soda to form sodium thiosulphate which is of no value as a cooking agent and, under some conditions, is actually detrimental.

In substantially all mills pulping with alkaline solutions of sodium salts, the amount of make-up soda required amounts to at least 10% of the soda circulating in the systems. In some of these, smelters do not exist and the make-up soda is added in the form of soda ash (sodium carbonate). In other mills which produce the chlorine required for bleaching, it is available in the form of sodium carbonate or caustic soda. In either case, it would be a simple operation to convert the caustic soda or sodium carbonate to sodium sulphite by the use of sulphur dioxide in an absorption tower. Sodium sulphite has an action similar to sodium sulphide in the pulping of wood and the sodium-sulphur compounds resulting therefrom in the spent liquors appear as sodium sulphide after passing through the recovery system. In order to demonstrate quantitatively the validity of this reasoning, the work presented in this paper was carried out.

Experimental

Two lots of scrub pine *(Pinus virginiana)* were were received from a paper mill located in Maryland and were barked and converted to chips in the usual manner. Cooks 1, 4, and 6 were made from one lot and cooks 7, 8, and 11 to 18, inclusive, were made from the other. The following conditions were maintained in all of the cooks:

Constant Conditions*

Species	*Pinus virginiana*
Chip length	0.75 inch
Maximum temperature	170° C.
Time to maximum	1.5 hours
Time at maximum	3.5 hours
Water ratio	4.5 to 1
Digester chip charge	5113 grams (moisture-free basis)
Digester	No. 1 (stainless steel)

* As the work progressed, it appeared desirable to alter some of the conditions; these changes are apparent from the data in Table I.

The water of crystallization of the sodium sulphide

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was considered in calculating the chemical and water ratios.

All cooks were made in a stationary stainless steel digester equipped for indirect heating and forced circulation. When the boiling point of the liquor was reached, the air pressure was relieved from the digester. At the conclusion of the cook, the digester was relieved to 50 p.s.i. pressure and the cook was blown.

Samples of black liquor were taken from each cook at the first, second, third, fourth, and fifth-hour intervals through a valve in the liquor circulating line. This valve was connected to a copper coil immersed in a water jacket. Samples of hot liquor taken with this arrangement were cooled to approximately 30° C. at the outlet of the copper coil. The cooling coil was rinsed with water before and after sampling. About 100 ml. of the liquor from the digester was discarded before the sample bottles were filled. These bottles, of approximately 250 ml. capacity, were completely filled to eliminate any air space at the top.

The large proportions of screenings in cooks 9 and 10 indicate that the water ratio used (4.5:1) was insufficient, either on account of the slower rate of penetration of the chips by the cooking liquor or because of the amount of liquor necessarily withdrawn periodically from the liquor to provide samples for analyses, and, therefore, the ratio was raised to 4.75:1. Cooking conditions were also increased in severity to obtain pulps with permanganate numbers more nearly comparable with those of cook 6. Cooks 11-18 were made with duplicate cooks for each set of conditions to more positively establish the results obtained. Samples of liquor were taken at regular intervals from each cook and one series of samples, representing each set of conditions, was analyzed for sodium and sulphur compounds. Beating and strength evaluation studies were made on all of the pulps obtained except those from cooks 7, 9, and 10 and the results are tabulated in Table I. One and one-half hours were required for all cooks (except cook 7) to reach maximum temperature. In cook 7, a sluggish digester was used which required 2 hours. The analytical data are presented in Table II.

Discussion

The chips from the second lot of scrub pine were slightly less penetrable by the liquor as is shown by the larger proportion of screenings for cooks 7 and 8 over that for cook 4. The improvement effected in cook 7 was accomplished by using 2 hours to reach maximum temperature instead of 1.5 hours as in cook 8. The need for a larger water ratio in the succeeding cooks is also evidence of this fact. The permanganate numbers, yields, and strength properties, however, indicate that the two shipments gave pulps that were as closely comparable as are duplicate pulping tests using chips from the same shipment. The strength tests indicate that the sodium sulphite-sodium sulphide combination is capable of producing papers substantially as strong as the regular kraft cooking process. There is a tendency, however, to show stronger tearing characteristics for equal bursting strength and this tendency might be of interest in mills making bag and similar grades of paper.

The sodium sulphite-sodium sulphide combination is distinctly slower in its cooking acton. At 170° C., 7.5 hours are required instead of 5 hours. By going to 175° C., however, which is usually possible if the digesters are built to stand the increased steam pressure, the cooking time could be reduced to 5.5 hours. By the use of 180° C., the cooking time could be reduced to 4.25 hours. Reduction in the amount of chemical at 180° C. indicates that exhaustion took place with consequent increase in screenings and failure to give a satisfactory cook on increase of the cooking time.

It is obvious that the physical characteristics of the pulp are sufficiently close to those possessed by the regular kraft process so that it would be entirely feasible to operate the sodium sulphite-sodium sulphide cook if the economics were right. A discussion of this phase of the problem is therefore in order.

In the kraft process, the efficiency of causticization of the sodium carbonate present in the dissolved smelt with calcium oxide is ordinarily 75%. The reduction of sodium sulphate to sodium sulphide will usually run about 92%. On this basis, in order to have a liquor that will deliver 15% sodium hydroxide and 7.3% sodium sulphide to the digesters, the total amount of chemicals will be as follows:

	%
NaOH as Na_2O	11.63
Na_2CO_3 as Na_2O	3.87
Na_2S as Na_2O	5.81
Na_2SO_4 as Na_2O	0.51
Total soda as Na_2O	21.82

On a basis of 43% yield, the amount of chemical in the white liquor charged to the digesters will be 1016 pounds of sodium oxide per ton of pulp. This would amount to the equivalent of 2328 pounds of salt cake charged to the digesters in the white liquor. The 300 pounds of salt cake required in the make-up chemical would indicate a recovery of 87.1%.

TABLE I.—SUMMARY OF COOKING, YIELD, PERMANGANATE NUMBER AND BEATER EVALUATION DATA

Cook	Maximum Temp. (°C.)	Total Cooking Time (hr.)	Water Ratio*	Chemical Ratio* % NaOH	% Na_2S	% Na_2SO_3	Yield Data** Total %	Screened %	Screenings %	Permanganate Number	Schopper Riegler Freeness, ml. 5'	25'	45'	65'	85'	Bursting Strength points/100 lb. 5'	25'	45'	65'	85'	Tear Factor 5'	25'	45'	65'	85'
1	170	5.0	4.5:1	15.0	7.3	0.0	44.3	44.1	0.4	19.7	845	800	590	295	165	99	146	152	148	134	2.80	1.80	1.58	1.33	1.33
6	170	5.0	4.5:1	15.0	7.3	0.0	45.7	45.4	0.6	23.1	845	800	680	365	200	115	157	171	173	168	2.46	1.80	1.53	1.45	1.29
4	170	5.0	4.5:1	15.0	3.6	7.4	47.0	45.4	3.3	29.0	845	830	725	445	215	109	148	166	170	161	2.60	2.00	1.83	1.59	1.36
7	170	5.5	4.5:1	15.0	3.6	7.4	47.5	45.0	5.2	27.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	170	5.0	4.5:1	15.0	3.6	7.4	49.4	42.5	13.9	30.4	860	820	700	370	180	95	146	171	169	157	2.82	1.83	1.64	1.36	1.29
15	170	7.5	4.75:1	15.0	3.6	7.4	46.9	43.6	7.1	24.1	860	815	660	350	170	104	158	170	151	148	2.71	1.92	1.61	1.48	1.26
18	170	7.5	4.75:1	15.0	3.6	7.4	46.8	45.1	3.6	22.9	845	815	665	360	180	98	149	160	152	151	2.71	1.88	1.92	1.34	1.32
11	175	5.5	4.75:1	15.0	3.6	7.4	47.1	44.0	6.6	24.1	855	820	680	350	180	96	146	154	160	158	2.79	1.82	1.60	1.59	1.38
14	175	5.5	4.75:1	15.0	3.6	7.4	46.5	43.9	5.6	23.9	870	820	650	320	160	106	147	164	157	152	2.62	1.91	1.58	1.53	1.23
12	180	4.25	4.75:1	15.0	3.6	7.4	46.0	44.2	4.1	24.3	860	810	695	310	160	96	153	169	162	144	2.80	1.84	1.48	1.37	1.28
16	180	4.25	4.75:1	15.0	3.6	7.4	46.3	42.8	7.5	22.8	860	820	645	300	165	95	148	157	154	140	2.77	1.95	1.63	1.48	1.27
13	180	4.75	4.75:1	14.0	3.2	6.6	47.4	42.7	10.1	27.5	860	820	660	320	150	98	155	169	167	155	2.79	1.90	1.61	1.50	1.27
17	180	6.0	4.75:1	14.0	3.2	6.6	46.5	43.1	7.3	26.1	850	770	635	305	155	90	152	160	153	157	2.88	1.80	1.55	1.46	1.29

* Based on moisture-free chip charge

** Yield calculations (moisture-free basis):
Total Yield, % = [(screened pulp) + (screenings)]/ chip charge × 100
Screened Yield, % = (screened pulp/chip charge) × 100
Screenings, % = [(screenings)/(screened pulp + screenings)] × 100

Beater Evaluations:
6500 grams on bedplate
Ream basis = 25 × 40 — 500

Using the sodium sulphite-sodium sulphide combination, the chemical charge would be as follows:

		%
$NaOH$ as Na_2O		11.63
Na_2CO_3 as Na_2O		3.87
Na_2S as Na_2O		2.86
Na_2SO_4 as Na_2O		0.25
Na_2SO_3 as Na_2O		3.64
Total		22.25
12.9%	=	2.87
3.64—2.87	=	0.77

Seventy-seven hundredths of a pound of sodium oxide in the form of sodium carbonate would have to be removed from the green liquor obtained by dissolving the smelt by exceeding the saturation point for sodium carbonate sufficiently to cause this amount of sodium oxide in the form of sodium carbonate to crystallize out. To this would be added 2.87 pounds sodium oxide in the form of purchased soda ash and the two would be sulphited by treatment with sulphur dioxide obtained by burning 1.88 pounds of sulphur.

In the kraft process, the sulphur balance is as follows (on the basis of 300 pounds of sodium sulphate make-up per ton of pulp):

	%
S in Na_2S	3.00
S in Na_2SO_4	0.26
Total S	3.26
S in make-up Na_2SO_4	0.74
S recovered	2.52

Many operators, however, find it necessary to add niter cake with the salt cake, so that about 1.11% sulphur on the basis of the dry wood may be taken as more nearly an average value. On this basis, the proportions would be as follows:

	%
Total S	3.26
S in make-up	1.11
S recovered	2.15

This would indicate a sulphur recovery of 66% with a soda base recovery of 87.9%.

The sulphur balance for the sodium sulphite-sodium sulphide cooks proposed would be as follows:

	%
S in Na_2S	1.48
S in Na_2SO_4	0.13
S in Na_2SO_3	1.88
	3.49

With 66% recovery of the sulphur, the amount of make-up as represented by the sodium sulphite is more than is necessary to maintain the balance. It is consequently of interest to formulate the conditions where all of the make-up soda required is added in the form of sodium sulphite. Such a formulation must be based upon a soda loss of 12.9% and a sulphur loss of not less than 34%. The following meets these conditions:

	As Na_2O	As S
$NaOH$	11.63	—
Na_2CO_3	3.87	—
Na_2S	3.33	1.72
Na_2SO_4	0.29	0.15
Na_2SO_3	2.83	1.46
	21.95	3.33

The cost for chemicals in the suggested operation would be as follows:

4.84 pounds Na_2CO_3	$.0484
0.73 pounds S	.0073
	$.0557

On the basis of 43% yield, the cost per ton of pulp will be $2.59.

TABLE II.—ANALYSIS OF THE COOKING LIQUORS SAMPLED AT VARIOUS TIMES DURING THE COOKS*

		Alkali as Na_2O			1 Na_2S		2 Na_2SO_3		3 $Na_2S_2O_3$		4 Na_2SO_4		5	6	7
					as	as	as	as	as	as	as	as	Sum as S	Total S (Direct	(6—5) = S Organically
Cook	Hour	Total	Strong	Active	Na_2S	S	Na_2SO_3	S	$Na_2S_2O_3$	S	Na_2SO_4	S	(1+2+3+4)	determination)	Combined
6	0	38.4	32.8	38.8	14.3	5.87	1.2	0.31	0.8	0.32	0.79	0.18	6.68	...	...
6	1	29.3	20.7	24.6	11.0	4.52	0.0	0.0	2.9	1.18	0.5	0.11	5.81	5.92	0.11
6	2	24.6	14.0	14.9	10.1	4.15	0.0	0.0	3.2	1.30	0.4	0.09	5.54	5.68	0.14
6	3	24.6	13.2	11.8	9.0	3.70	0.0	0.0	3.6	1.46	0.3	0.07	5.23	5.55	0.32
6	4	24.3	12.4	10.5	9.0	3.70	0.0	0.0	3.6	1.46	0.4	0.09	5.25	5.50	0.25
6	5	24.6	11.6	9.3	8.3	3.41	0.0	0.0	3.6	1.46	0.3	0.07	4.94	5.16	0.22
4	0	34.8	31.6	32.0	7.5	3.08	15.1	3.83	0.8	0.32	0.84	0.19	7.42	...	...
4	1	26.9	20.1	19.2	0.9	0.37	11.5	2.92	3.2	1.30	1.0	0.23	4.82	6.77	1.95
4	2	21.7	12.4	9.9	0.6	0.25	7.2	1.83	4.0	1.62	0.7	0.16	3.86	6.54	2.68
4	3	21.2	10.8	8.0	0.7	0.29	5.0	1.27	5.3	2.15	0.7	0.16	3.87	6.76	2.89
4	4	19.8	10.6	6.4	0.7	0.29	3.3	0.84	5.7	2.31	0.7	0.16	3.60	6.44	2.84
4	5	21.0	10.7	5.9	0.6	0.25	2.4	0.61	6.0	2.43	0.7	0.16	3.45	6.08	2.63
18	0	32.2	27.6	28.7	7.2	2.95	13.1	3.33	1.0	0.41	0.8	0.19	6.88	...	...
18	1	25.1	19.7	18.9	4.5	1.84	9.6	2.43	4.4	1.79	1.5	0.34	6.40	6.60	0.20
18	2	19.4	11.5	10.1	2.4	0.98	2.9	0.73	7.9	3.19	1.8	0.40	5.30	6.35	1.05
18	3	18.8	10.0	7.6	2.3	0.93	2.1	0.54	6.9	2.81	1.3	0.30	4.58	5.97	1.39
18	4	18.8	9.6	6.3	1.9	0.80	1.2	0.30	7.1	2.88	1.2	0.28	4.26	5.84	1.58
18	5	19.2	9.3	5.8	1.2	0.50	3.0	0.75	5.4	2.17	1.6	0.36	3.78	5.78	2.00
18	6	18.4	8.5	5.1	1.2	0.49	1.4	0.35	6.3	2.56	1.6	0.35	3.75	5.61	1.86
18	7	18.9	8.3	4.0	0.1	0.05	1.1	0.27	6.6	2.68	1.1	0.25	3.25	5.92	2.67
18	7½	18.9	7.8	4.6	1.8	0.72	2.5	0.64	5.8	2.37	0.9	0.21	3.94	5.65	1.71
14	0	32.2	27.6	28.7	7.2	2.95	13.1	3.33	1.0	0.41	0.8	0.19	6.88	...	...
14	1	24.8	18.2	17.4	1.2	0.49	6.8	1.74	7.7	3.10	1.3	0.29	5.62	6.43	0.81
14	2	19.9	11.0	8.8	0.3	0.13	1.2	0.29	9.4	3.81	1.1	0.24	4.47	6.02	1.55
14	3	18.8	9.1	5.9	0.2	0.10	1.2	0.29	8.8	3.56	1.0	0.23	4.18	5.58	1.40
14	4	19.6	9.1	5.9	0.8	0.32	2.0	0.52	6.4	2.59	0.8	0.18	3.61	5.87	2.26
14	5	19.3	8.5	4.9	0	** 0	0.6	0.16	8.3	3.36	0.7	0.17	3.69	5.89	2.20
14	5½	19.6	8.2	5.0	1.0	0.41	1.3	0.32	7.8	3.17	0.9	0.20	4.10	6.03	1.93
16	0	32.2	27.6	28.7	7.2	2.95	13.1	3.33	1.0	0.41	0.8	0.19	6.88	...	...
16	1	22.6	15.8	15.9	3.3	1.34	6.0	1.52	8.3	3.35	1.3	0.30	6.51	6.70	0.19
16	2	20.4	11.1	10.0	2.0	0.80	2.5	0.63	8.3	3.35	1.1	0.25	5.03	6.38	1.35
16	3	19.3	9.4	6.8	2.3	0.92	2.4	0.61	6.8	2.77	0.8	0.19	4.49	6.08	1.59
16	4¼	19.3	8.3	6.2	2.2	0.90	1.8	0.45	7.0	2.83	1.0	0.22	4.40	6.16	1.76
17	0	31.2	27.4	28.0	6.6	2.71	12.6	3.20	1.0	0.41	0.8	0.17	6.49	...	...
17	1	20.4	13.2	13.1	3.1	1.27	5.4	1.38	3.0	1.22	1.3	0.29	4.16	5.73	1.57
17	2	17.2	8.1	7.3	2.0	0.81	2.8	0.71	4.1	1.67	1.2	0.26	3.45	5.12	1.67
17	3	17.5	7.7	5.4	1.9	0.76	0.7	0.18	6.7	2.70	1.6	0.36	4.00	5.34	1.34
17	4	17.2	7.1	5.0	1.7	0.69	1.1	0.29	5.1	2.05	1.4	0.31	3.34	5.08	1.74
17	5	16.8	6.4	4.1	1.3	0.55	0.8	0.19	5.5	2.25	1.2	0.27	3.26	5.14	1.88
17	6	16.3	6.3	2.6	0.2	0.09	0.1	0.03	5.7	2.31	1.5	0.34	2.77	5.27	2.50

* All results are expressed in grams per liter.

** By qualitative test only. The sample became exhausted before a satisfactory run by the quantitative procedure was obtained.

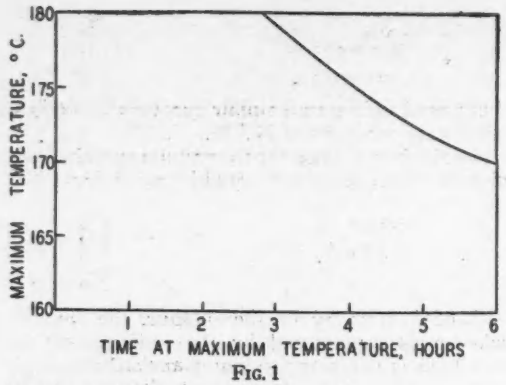

FIG. 1

Relationship between Time and Temperature

		%
Cooking liquor	NaOH	15.0
(Chemical on weight of chips)	Na_2S	3.2
	Na_2SO_3	6.6

Time up to maximum temperature, 1.5 hr.
Water ratio, 4.75 to 1.00
Permanganate number, 24

The cost of 300 pounds of salt cake at $17.00 per ton is $2.55; therefore, it is evident that, on the basis suggested, the use of sodium sulphite will cost little, if any more, than the cost of salt cake in the kraft process.

The data of Table II indicate practically no significant change in sulphur content of the cooking liquor throughout the cook, whether the regular kraft or the sodium sulphite-sodium sulphide combination is used. There is more organically combined sulphur in the case of the combination which would probably explain the reduced odor of mercaptans at the time of blowing and relief. The combination cooks should be of interest to mills facing complaint from communities that object to the odor of mercaptans which is characteristic of kraft cooking.

The use of the sodium sulphite-sodium sulphide combination is also of interest in connection with the impregnation-injection method of cooking as disclosed in United States patent 1,949,669 (March 6, 1934). Arnold and Wells [Kraft pulping with low sulphidity, This patent is the basis of the recent article by *Paper Trade J.* 113, No. 9:39-42 (August 28, 1941)] in which they studied the behavior of jack pine. The addition of the sulphidity required through the use of sodium sulphite as the make-up chemical in conjunction with the injection liquor would offer a simple means of bringing about the advantages manifest.

The data presented in Table I are ample for the establishment of the relationship between temperature of cooking and time required to produce pulp of a definite permanganate number. This relationship is shown in Fig. 1.

Railway Supply & Mfg. Co. Joins TAPPI

The Railway Supply and Manufacturing Company of Cincinnati, Ohio has become a sustaining member of the Technical Association of the Pulp and Paper Industry. The company was organized more than fifty years ago to sell supplies and cotton waste to railroads. As operations were extended to merchandising other cotton mill products, the fiber department outgrew the original operations. For the past ten years the company has concentrated on the handling of fibers from the cotton mills and the cotton oil mills, as well as raw cotton. Its active research leadership in developing wider markets for cotton fibers of all types is finding responsive cooperation in many industries which seek new raw material sources to meet the changing conditions.

The growing use of cotton linters by the makers of fine paper illustrates how extensive research in one industry is often helpful in meeting problems of an entirely different industry. Makers of fine quality writing paper recognize that there is no satisfactory substitute for cotton in their product. Working with the Railway Supply and Manufacturing Company the technical men of the fine paper industry have been able to demonstrate the practicability and special advantages of working with virgin cotton fiber in its original form. The RAYCO Linter Cotton (long fiber, carefully graded, first-cut cotton linters) has received considerable attention. The product is all cotton, and said to be consistently uniform. There are no different colors to eliminate, no adhesives, rayon or other contaminating materials to remove. No sorting is required before changing to the cooker.

William H. Jones, vice president of Railway Supply is devoting most of his time, together with a number of trained technical men to developing the cotton linter utilization by the paper industry. He is the official representative of his company in the Technical Association.

Colloid Chemistry

Volume V of Colloid Chemistry, Theoretical and Applied has just been issued by the Reinhold Publishing Company. This 1526 page volume was brought together by Jerome Alexander, the noted colloid chemist and more than fifty collaborating authors, each a specialist in the subject covered by his chapter. The latter half of the book deals with biology and medicine and is therefore of specialized interest but the first 500 pages relate to the theories and methods of colloid chemistry as represented by such topics as: the surfaces of solids and liquids and the films that form upon them; solutions of soaps and detergents; methods of analyses of complex molecular structures with aid of X-rays; microradiography of colloidal materials; states of aggregation of some paraffin chain compounds; polymerization; the electron microscope; absorption, sonic and ultrasonic waves in colloid chemistry and rheological properties of simple and colloidal systems.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 E. 42nd street, New York 17, N. Y. at $20.00 per copy.

TAPPI Byproducts Committee to Meet

The TAPPI Byproducts Committee will sponsor a meeting at the De Soto Hotel, Savannah, Ga., on October 18-19, 1944 to discuss technical problems relating to tall oil and other sulphate pulping byproducts. Torsten Hasselstrom will discuss fundamental research in this field. Arthur Polak will discuss New Byproducts. R. H. McKee will talk on Industrial Uses and Marketing Problems relating to tall oil. M. L. Taylor will report on Survey of Equipment Construction Materials Used in Tall Oil Plants and S. G. Norton of Hercules Powder Company will speak on Uses of Crude Sulphate Wood Turpentine.

The meeting will be open to all interested. Reservations should be made through Kirk Sutlive, Union Bag and Paper Corporation, Savannah, Ga.

Demineralizing of Water for the Pulp and Paper Industries*

By Eskel Nordell[1]

Abstract

Chlorides, sulphates, and sodium are neither removed nor reduced in amount by the usual water conditioning processes used in pulp and paper mills. For certain uses these impurities may be objectionable and formerly the only method known for their removal was the expensive process of distillation. Now there is available an ion exchange process for removing these impurities. The effluents furnished by this process compare very favorably in quality with distilled water and are produced at an operating cost which is usually only a small fraction of the cost of distillation. This demineralizing process is already in use in the production of dielectrics and will undoubtedly find many other applications in the pulp and paper industry.

The pulp and paper industry has long realized the tremendous importance of the water used in processing and the profound effect that water impurities have on their products. Color in water, for instance, gives objectionable stains and off shades. Suspended matter or turbidity dulls both white and colored products.

Iron and manganese, even when present to the extent of only a few tenths of a part per million, cause stains on all products even the unbleached ones. Such small amounts of these metals are also sufficient to promote the growth of various iron and manganese bacteria, popularly, collectively and also erroneously, called "crenothrix." These "crenothrix" growths clog pipe lines, nozzles, pumps, circulating systems, etc., and have an unfortunate habit of letting go in batches with results that are much better if only imagined than actually experienced.

Hydrogen sulphide is another impurity which does not have to be overly evident in order to cause a lot of damage. One part per million or over can easily be detected by its characteristic rotten egg odor. Yet even "nonsmellable" amounts are corrosive while "smellable" amounts shorten the life of the wire to a surprising extent and exert a markedly corrosive effect on screens, piping, and other metal products with which the water comes in contact.

Hardness is another objectionable water impurity. In the boilers, its effects are too well-known to need any comment. But the bad effects of hardness are not exclusively confined to the boilers; they are also evident in the process and cooling waters. Hardness, especially calcium bicarbonate hardness, forms scale on the wire, screens, deckers, condensers, pumps, recirculating systems, etc. Bicarbonates also neutralize and waste alum while hardness, both bicarbonate and nonbicarbonate, precipitate resinates and, in contact with alkalies, form scale and sludge. In bleaching, for instance, calcium carbonate scale frequently forms on the sides of the tanks and has a disconcerting tendency to break loose in the form of discolored chunks and contaminate the pulp.

These water impurities may be reduced to definite tolerances by certain well known methods of water treatment. Color and turbidity may be reduced by coagulation and filtration; iron and manganese by oxidation and filtration; hydrogen sulphide by flue gas, aeration and chlorination; and hardness by the cold or hot lime soda processes or by the sodium zeolite process.

None of these processes reduce or remove sodium salts or chlorides or sulphates. Therefore, the treated water contains at least as much chloride, sulphate and sodium as the raw water. In fact, the effluent may contain more sodium and more sulphate than the raw water.

For certain purposes these constituents are objectionable even when present in relatively small amounts. Formerly distillation was the only process available for removing chlorides or sulphates or any sodium salts from water. Distillation is effective but it is also expensive. Now there is available a process for removing dissolved salts from water, without using the agency of heat, by simply passing the water through granular beds of ion exchangers. This process is known as "demineralizing" and, with most water supplies, the costs of demineralizing are only a small fraction of the costs of distillation.

Demineralizing by Ion Exchange

In demineralizing water by the ion exchange process, the water used may be a naturally clear well water, a filtered surface water, properly treated effluents from the cold lime softening process, or the cold lime and magnesia silica removal process. Commonly speaking, such waters contain various salts such as the bicarbonates, sulphates and chlorides of sodium, calcium, and magnesium.

At the dilutions obtained in such waters, these salts are practically completely ionized. Therefore, the salts, as such, are not actually present. Instead, the water contains cations of sodium, calcium, and magnesium and anions of bicarbonate, sulphate, and chloride. Certain other cations and anions, such as the cation of potassium or the anion of nitrate, may also be present. As these latter are usually present only in small amounts and as their removal is effected by the same reactions as the others, the reactions, for the sake of simplicity, will be limited to the more abundant ions.

In the ion exchange demineralizing process, there are two main steps and an optional third step. In the first step, the water is passed through a hydrogen cation exchanger. This removes the cations of sodium, calcium, and magnesium and replaces them with hydrogen ions. In the second step, the effluent from the first step is passed through an anion exchanger (or acid remover) which removes the anions of sulphate and chloride (or their corresponding acids). The bicarbonates are transformed in the first ste

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to carbon dioxide and water. This carbon dioxide goes through the second step unchanged. If the carbon dioxide content of the effluent from the second step is objectionable, for the purpose intended, then the optional third step—aeration may be used to remove it.

Organic Cation Exchangers

In the familiar sodium zeolite process, hard water is softened by simply passing it through a bed of granular sodium zeolite which has the ability to abstract calcium and magnesium cations from the hard water and replace them with sodium cations. Thus the bicarbonates, sulphates, and chlorides of calcium and magnesium present in hard water are transformed by the softening process into the corresponding salts of sodium. It is evident that this method does not reduce the total number of ionic constituents present.

Zeolites used in this process are certain double silicates which may be represented by the general formula Na_2O, Al_2O_3 $(SiO_2)x$, $(H_2O)n$ where x represents from 5 to 13 molecules of SiO_2, and n stands for a rather indefinite amount of water of hydration. Hydrogen cation exchange with siliceous zeolites is impractical because a regenerating acid would decompose the zeolite.

With the advent of organic cation exchangers, this latter limitation was removed. Organic cation exchangers are synthetic materials which not only are capable of carrying out all of the cation exchanges which may be effected with the siliceous zeolites, but in addition may be used to exchange hydrogen ions for metallic ions. Utilization of this fact constitutes the first step in demineralization.

The coal derivatives, such as Zeo-Karb, were the earliest organic cation exchangers developed and have been most extensively applied in practice. Installations have been operating for a number of years and for thousands of cycles without deteriorating physically, dropping in capacity, or developing colored effluents. It appears that although some resins are slightly higher in capacity, a good sulphonated coal is more resistant and has greater stability. In physical properties, Zeo-Karb is a hard, black, granular material which weighs approximately 30 pounds per cubic foot when shipped.

When regenerated with sodium chloride the principle advantage of these organic cation exchangers over zeolites is that, being nonsiliceous in nature, they eliminate the danger of silica pick-up by the water being softened. They do not, of course, reduce the total mineral salt content, but act similarly to the zeolites.

Regeneration Reactions

When an organic cation exchanger is regenerated with an acid, such as sulphuric acid, instead of sodium chloride, it requires replaceable hydrogen ions. The cation exchange material, when so regenerated, is the H exchanger whereas, when regenerated with sodium chloride, it is the Na exchanger. Water containing mineral salts, when passed through a bed of the H exchanger, loses metallic ions to the exchange material and gains hydrogen ions in exchange. In this manner, not only are the cations of calcium and magnesium removed but also the cations of sodium or any other metallic cation present.

The reactions involved in this first step are shown in Chart I.

Since, as shown in the above reactions, hydrogen cations are given up in exchange for the other cations, this results in the formation of equivalent amounts of acids corresponding to the anions present in the raw water. Thus sulphates are transformed to sulphuric acid, chlorides to hydrochloric acid, and bicarbonates to carbonic acid. In the latter case the carbonic acid formed immediately breaks down into free carbon dioxide and water. Therefore, with a water that contained nothing but bicarbonates, this process would provide an effluent containing only carbon dioxide, easily removable by aeration, so that the net result would be an effluent comparable to distilled water in quality.

Since sodium bicarbonate would be removed in the same manner as the bicarbonates of calcium and magnesium, this process for the first time offers a method other than distillation for removing sodium bicarbonate. Naturally, therefore, it has been widely used in the treatment of waters containing sodium alkalinity as well as bicarbonate hardness. Such waters are much more common in occurrence than is generally recognized and, while more prevalent in certain sections, are not confined to any one locality.

When the useful hydrogen exchange action has been exhausted, it is regenerated with a solution of either sulphuric or hydrochloric acid. The regenerating reaction with sulphuric acid, which is the commonly used regenerant shown in Chart II.

Organic Anion Exchangers or Acid Absorbents

While the hydrogen cation exchanger will completely remove bicarbonates, most waters also contain appreciable amounts of sulphates and chlorides. The

H EXCHANGER REACTIONS

Note:—The Symbol Z represents cation exchange radical

REACTIONS WITH BICARBONATES

Ca / Mg / Na$_2$	$(HCO_3)_2$	+	H_2Z	=	Ca / Mg / Na$_2$	Z	+	$2H_2O$	+	$2CO_2$
Calcium, magnesium and/or sodium (soluble)	Bicarbonate	+	Hydrogen exchanger (insoluble)	=	Calcium, magnesium and/or sodium (insoluble)	Exchange radical	+	Water	+	Carbon dioxide (soluble gas)

REACTIONS WITH SULPHATES OR CHLORIDES

Ca / Mg / Na$_2$	SO_4 / Cl_2	+	H_2Z	=	Ca / Mg / Na$_2$	Z	+			H_2SO_4 / $2HCl$
Calcium, magnesium and/or sodium (soluble)	Sulphates and/or chlorides	+	Hydrogen exchanger (insoluble)	=	Calcium, magnesium and/or sodium (insoluble)	Exchange radical	+			Sulphuric and/or hydrochloric acids (soluble)

Chart I

REGENERATION REACTIONS

$$\left.\begin{matrix}Ca\\Mg\\Na_2\end{matrix}\right\}Z + H_2SO_4 = H_2Z + \left.\begin{matrix}Ca\\Mg\\Na_2\end{matrix}\right\}SO_4$$

Calcium, magnesium and/or sodium (insoluble) — Exchange radical + Sulphuric acid (soluble) = Hydrogen exchanger (insoluble) + Calcium, magnesium and/or sodium (soluble) — Sulphates

Chart II

removal of these requires, therefore, a second step to eliminate the sulphuric acid and hydrochloric acid formed in the first step. This is accomplished by means of certain synthetic organic materials known as anion exchangers or acid absorbents. The latter term may be the better one as the reaction is probably an absorption of the entire acid molecule. However, the term anion exchanger is more widely used. In any event, they will remove acids from water completely, and can be regenerated, thus renewing their capacity for acid removal.

The earlier anion exchangers, such as *m*-phenylene-diamine-formaldehyde resins and the insoluble basic dyestuffs, were not very successful as their capacities were rather low, they had a tendency to throw color and their life was quite limited. As the result of intensive research work new products were developed which got away from these undesirable properties. Typical of these new anion exchangers is the aliphatic amine resin. De-Acidite, a granular brown resin which weighs about 40 pounds per cubic foot when shipped.

When a water containing hydrochloric or sulphuric acid or mixtures of these is passed through a bed of granular anion exchanger, the acids are quantitatively removed. After the useful anion removing properties have been exhausted, the exchanger may be regenerated with a solution of soda ash. These cycles of anion removal and regeneration may be repeated for hundreds of cycles with only a small drop in capacity, no color contamination and no rise in the electrolyte content of the effluent. It is still too early to state that the life of these anion exchangers equals that of the resistant sulphonated coal cation exchangers which have been operating day in and day out for years without any apparent drop in capacity, but, to date, commercial installations of anion exchangers have performed satisfactorily.

The reaction involved in this second step and in the regeneration of the anion exchangers are shown in Chart III.

If the content of free carbon dioxide in the effluent is objectionable, the effluent is aerated to remove the carbon dioxide. In small installations a decarbonation tank is frequently used. In this, by means of an air grid and air compressor, air is blown through the water. In larger installations, the effluent is usually passed through a degasifier. Here, the water raining down over a series of trays is met by a counter-current of air which effectively reduces the carbon dioxide to a very low figure. Such an arrangement is shown diagrammatically in Fig. 1.

With some waters high in sulphates and chlorides and where tolerances for these are low, recycling may be required. Depending on the composition of the raw water and the results required, such recycling may be practiced with only a part of the effluent or with all of the effluent. These processes are known, respectively, as partial or complete recycling processes.

Results obtained are excellent as shown in Table I which shows analyses of the effluents obtained in seven industrial demineralizing installations, and also shows the costs for regenerants which constitute the principal operating costs for the process.

Silica, however, is not removed by this process and, in those cases where silica removal is of importance, it should be done as a preliminary step before the demineralizing process. For most applications, the silica content of the raw water is low and, except in the treatment of siliceous water for high pressure boilers, silica removal is usually unnecessary.

Removal of mineral salts effected by this demineralizing process compares very favorably with removal by distillation. Theoretically, of course, distilled water should be free from nonvolatile mineral salts.

TABLE I.—ANALYSES AND COST DATA FOR INDUSTRIALLY DEMINERALIZED WATER

Plant	Hardness (p.p.m. as $CaCO_3$) raw	Hardness (p.p.m. as $CaCO_3$) demin.	Alkalinity (p.p.m. as $CaCO_3$) raw	Alkalinity (p.p.m. as $CaCO_3$) demin.	Chlorides (p.p.m. as Cl) raw	Chlorides (p.p.m. as Cl) demin.	Sulphates (p.p.m. as SO_3) raw	Sulphates (p.p.m. as SO_3) demin.	Cost of Treatment (cents per 1000 gal.)
J	43	0	34	3	4	0	19	0	3.0
K	61	0	24	2	8	0	26	0	4.9
L	116	0	58	3	2	0	70	0	8.2
M	120	0	93	4	33	0	38	0	9.5
N	212	0	140	6	24	2	80	1	15.3
O	261	0	188	2	10	0	60	0	11.5
P	302	1	227	4	25	0	60	1	16.0

Note: Zero, as used, means less than 1 p.p.m.

ANION EXCHANGE

Note:—The symbol D represents the Anion exchange radical

REACTIONS WITH SULPHURIC AND HYDROCHLORIC ACIDS

$$D + \left\{\begin{matrix}H_2SO_4\\2HCl\end{matrix}\right. = D\left\{\begin{matrix}\cdot H_2SO_4\\\cdot 2HCl\end{matrix}\right.$$

Anion exchanger (soluble) + Sulphuric and/or hydrochloric acids = Anion exchange radical (insoluble) — hydrosulphate and/or hydrochloride

REGENERATION REACTIONS

$$D\left\{\begin{matrix}\cdot H_2SO_4\\\cdot 2HCl\end{matrix}\right. + Na_2CO_3 = D + Na_2\left\{\begin{matrix}SO_4\\Cl_2\end{matrix}\right. + H_2O + CO_2$$

Anion exchange radical (insoluble) — hydrosulphate and/or hydrochloride + Soda ash (soluble) = Anion exchanger (insoluble) + Sodium (soluble) — Sulphate and/or chloride + Water + Carbon dioxide (soluble gas)

Chart III

In commercial practice, however, this is not the case as is shown in the analyses of distillates taken at random from nine industrial plants listed in Table II. The reasons for this are probably found in entrainment from the still plus leakage in the condenser, especially after the condenser has been in operation for some time.

TABLE II.—ANALYSES OF NINE INDUSTRIALLY DISTILLED WATERS

Plant	Hardness (p.p.m. as $CaCO_3$)	Alkalinity (p.p.m. as $CaCO_3$)	Chlorides (p.p.m. as Cl)	Sulphates (p.p.m. as SO_4)
A	0	13	4	0
B	6	9	0	0
C	10	18	0	0
D	10	15	0	0
E	0	5	2	2
F	0	5	2	3
G	0	4	1	3
H	15	12	2	5
I	1	2	0	1

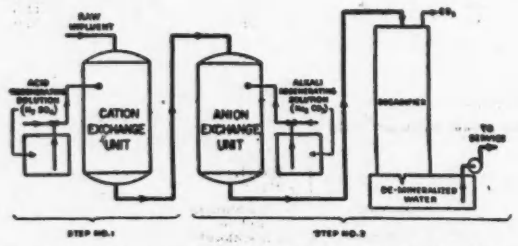
Operating Costs

As far as operating costs are concerned, they are principally for the regenerants used. In Table I, the costs of the regenerants for seven installations are given and, since these waters cover a wide range in composition, a good idea of operating costs with various waters may be readily obtained.

It will be noticed that the operating costs for these particular waters range from $0.03 to $0.16 per 1,000 gal. Compared with this, distillation costs vary according to the number of effects used and the cost of fuel. In single and double effect stills, or evaporators as they are commonly called, the cost of distillation varies from about $2.00 to $8.00 per 1,000 gal. Quadruple effect evaporators, while more complicated to operate and much higher in price, are more efficient and the cost of distillation in them varies from $0.60 to somewhat over $1.00 per 1,000 gal.

These figures are comparative in that one gives the cost of reagents while the other gives the cost of fuel. No attempt has been made to include fixed charges as these would be meaningless unless based on waters of the same mineral concentration and against single, double, triple, and quadruple effect evaporators.

It will also be noted that the cost of demineralizing varies with the mineral salts content of the raw water. With distillation, this is usually not the case as the cost is not greatly affected by different compositions of the raw water, although highly saline waters, by increasing the amount of blowdown, or hard waters which require softening before distilling, do increase distillation costs.



Step No. 1—Replacement of Metallic Cations by Hydrogen (H Ion) Converts Salts Present in Raw Water into Corresponding Acids (Viz. HCl, H_2SO_4, H_2CO_3)

Step No. 2—Removal of Acids Formed in Step No. 1. The HCl and H_2SO_4 Are Absorbed in the Anion Exchange Unit and the H_2CO_3 Decomposes into H_2O and CO_2, This CO_2 Escaping to the Atmosphere in the Degasifier

FIG. 1
Diagram of Demineralizing Plant

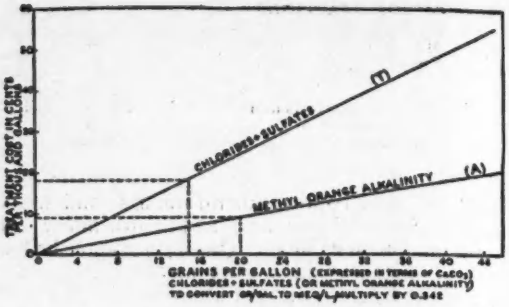

CHLORIDES + SULFATES
(T)
METHYL ORANGE ALKALINITY
(A)
GRAINS PER GALLON (EXPRESSED IN TERMS OF CaCO3)
CHLORIDES + SULFATES (OR METHYL ORANGE ALKALINITY)
TO CONVERT GR/GAL. TO MEQ/L. MULTIPLY BY 0.342

FIG. 2
Demineralizing Regeneration Cost

Many Post-War Applications Approximating Costs

The accompanying chart, Fig. 2 provides a means by which approximate costs of demineralizing may be calculated. It is based on costs of $40.00 per ton for soda ash and $40.00 per ton for sulphuric acid, which are higher than the costs would be for plants using large quantities of these reagents. It will be noted that the costs are the sum of the results obtained from two curves and that the cost of removing bicarbonates is much lower than the cost of removing sulphates and chlorides. This is because only a single reagent—sulphuric acid—is required for the former, while two regenerants—sulphuric acid and soda ash—are required for the latter.

Sizes and Uses of Demineralizing Plants

Demineralizing plants are available in a wide range of sizes to meet any industrial requirement. Plants installed and under construction have ranged from as low a flow rate as 1 g.p.m. up to many thousands of g.p.m. Due to wartime restrictions, the demineralizing process has as yet found but few applications in the pulp and paper industry. One of these is in the manufacture of dielectrics where it has been successful both in improving the product and in reducing operating costs.

Special Requirements

There will, of course, be many other applications in the pulp and paper industry and a certain amount of experimental work has already been done on a number of these. In general, it may be said that this ion exchange demineralizing process is applicable to the manufacture of articles that require a low ash content or a low hardness, low chloride, or low sulphate content. It has also found many applications in the manufacture of various plastics and other synthetics.

In most of these cases, the process is applied to only a small fraction of the total water employed for obviously there is no need for demineralizing until the electrolytes have been rinsed out to about the concentration obtained in the mill water. Then demineralized water is used for the final stages. Therefor, the cost of demineralizing applies to only a fraction of the total process waters and, with most natural water supplies, this works out at a very reasonable figure. It is therefore to be expected that this ion exchange method of demineralizing water will find many post-war applications in pulp and paper mills.

Conditioning Paper and Paperboard for Testing*

Revision of TAPPI Official Standard T 402 m-41

Relative Humidity and Temperature

Whenever standard conditioning is required in a test method, the sample shall be conditioned and tested in an atmosphere maintained at 50% relative humidity and 23°C. (73°F.) temperature. A tolerance is permissible (unless for precise work) of plus or minus 2 in the percentage relative humidity (48 to 52%) and of plus or minus 2°C. (3.5°F.) in temperature. (*See* Note 1.)

Conditioning

Suspend each test specimen of the sample so that the conditioning atmosphere will have free access to all surfaces. Means shall be provided for so circulating the air of the conditioning and testing chamber that its humidity and temperature will be uniformly maintained. The conditioning time shall be sufficient for the moisture content of the specimen to attain equilibrium with the conditioning atmosphere. Determine this by conditioning until there is no significant change in the weight of the specimen (i.e., less than 1 part in 1000). For papers that are not highly resistant to water vapor, weigh at intervals of not less than 2 hours; for highly resistant papers such as hard, surface-sized bond and ledger papers, at intervals of not less than 12 hours; for papers that have been given special treatment for resistance to water vapor, and for paperboards, at intervals of not less than 24 hours. (*See* Notes 2 and 3.)

For work of such precision that the hysteresis in the equilibrium moisture content may lead to an appreciable error, the moisture content equilibrium under standard conditions shall be approached from a drier state by first reducing, if necessary, the moisture content to less than half the value under standard conditions and then conditioning under standard conditions. For that purpose the samples may be dried in a desiccator or other convenient means, provided the temperature does not exceed 60°C. (140°F.).

Determination of Humidity and Temperature

Determine the relative humidity of the conditioning atmosphere by means of either (1) a sling psychrometer, or (2) a stationary type of psychrometer having the air circulated over the thermometer bulbs mechanically. (*See* Note 4.) In both cases the circulation of air around the thermometer bulbs shall be at the rate of not less than 3 meters (10 feet) per second and the exposure not less than 60 seconds before the readings are taken. When the sling type is used, make the readings, especially of the wet bulb, as quickly as possible after bringing it to rest.

The thermometers used for determining humidity and temperature shall be accurately calibrated by comparison with certified standard thermometers and any corrections found necessary applied to the readings. (*See* Note 5.)

From the wet-bulb and dry-bulb readings calculate the relative humidity from the accompanying psychrometric chart.

Notes

1. The wet-bulb temperature in degrees F., corresponding to a relative humidity of 50%, at a given air temperature, t°F. (dry bulb), and a given barometric pressure, B inches of mercury, is given by the equation:
Wet-bulb temp., °F. (50% R. H.) $= 0.827t + 0.72 - 0.15\ (30 - B)$.
2. With good circulation a conditioning period of 4 hours is usually sufficient for papers of ordinary weight and composition, but some hard-sized papers, paperboards, and water-resistant specialties may require 48 hours or longer.
3. After the test specimens are conditioned they should be handled as little as possible and not breathed upon.
4. It is preferable to draw the air over the thermometer bulbs rather than to blow it over them, as in the latter case the heat of the fan causes errors in the readings.
5. It is recommended that thermometers approaching the following specifications be used: Range 0 to 50°C. (32 to 122°F.); graduation, 0.2° C. (0.5° F.). They should be matched to within 0.1° C. (¼° F.) throughout the range used. Under ordinary conditions an error of 1 in the percentage of relative humidity corresponds to an error of approximately 0.25° F in the wet-bulb depression.

* This revised method has been approved by the Paper Testing Committee. Criticisms are earnestly requested and should be sent to R. G. Macdonald, Secretary, Technical Association of the Pulp and Paper Industry, 122 E 42nd St., New York, N. Y. Reprints of this standard may be obtained from the Secretary at 25 cents each.

Industrial Relations Handbook

The Dartnell Corporation has just issued the 2nd Ed. of its Handbook of Industrial Relations, edited by Aspley and Whittemore (1169 pp. 5 x 8). This very timely volume should be of wide interest to executives of the paper industry. The editors have brought together the views, the tested methods, the experiences and practices of companies which have been successful in building sound relationships with their employees.

Among the subjects covered are trends in industrial relations, negotiating a labor contract, grievance procedures, settling labor disputes, employee-management committees, production drives, multiple-shift problems, labor supply problems, women in industry, employment methods and records, qualifications for various jobs, training and upgrading, developing better supervisors, employee attitude and cooperation, incentives and reducing employee turnover, shop rules and discipline, suggestion systems, morale building techniques, employee publications, vacation practices, credit unions, health, accident and fire prevention, department organization and relations with the public, community, press, employees family and government.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York 17, N. Y. at $7.50 per copy.

The Process Industries Division of the American Society of Mechanical Engineers will meet at 29 West 39th street, New York, N. Y., on October 31, 1944 (at 7:30 P.M.). C. J. Sibler, Supervisor of Power, of the West Virginia Pulp and Paper Company, and J. E. Warner, chief engineer, Robert Gair Company, Inc., will discuss "Improvements in the Pulp and Paper Industry." E. F. Burns, chief engineer, International Paper Company, will preside as chairman.

TAPPI Notes

Harold R. Alley, formerly with Tested Papers of America, Inc., is now associate research director for the Standard Cap & Seal Corp., 1200 W. Fullerton avenue, Chicago, Ill.

Ralph E. Hayes, formerly of the Quebec North Shore Paper Company, Ltd., is now research and development engineer for the Ontario Paper Company, Thorold, Ont.

John Ware is now vice president of General Mills, Inc., of Brazil, Rio de Janiero, Brazil.

Harold T. Fretz has been transferred from the Port Angeles, Wash., mill to the Hoquiam, Wash. mill of Rayonier, Inc.

H. R. Braak, who was in charge of industrial development for the Dutch East Indies, is reported to be interned in that country. Dr. Braak was cooperating with J. E. Sirrine Company in developing plans for a new pulp and paper mill prior to the outbreak of hostilities.

The TAPPI Pacific Section will meet at Camas, Wash. on November 14, 1944.

A relatively large attendance is expected at the meeting of the Technical Association of the Pulp and Paper Industry to be held at the De Soto hotel, Savannah, Ga., on October 18-20, 1944. This meeting is being sponsored by the TAPPI Alkaline Pulping and TAPPI Byproducts Committees.

The Lake States TAPPI Section will meet at the Conway Hotel, Appleton, Wis. on Wednesday, October 11th at 6:30 P.M. There will be a panel discussion of sulphite and kraft pulping led by John Strange of The Institute of Paper Chemistry. The panel will consist of G. F. Enderlein of The Mosinee Paper Mills Company, R. A. Nugent, Nekoosa-Edwards Paper Company, M. L. Downs, Thilmany Pulp and Paper Company, G. H. Chidester, Forest Products Laboratory and W. H. Swanson, Kimberly-Clark Company. At 4:00 P.M. Edwin C. Jahn, Professor of Forest Chemistry at the New York State College of Forestry will talk on "Wood Utilization in the Pulp and Paper Industry of Scandinavia" at a meeting of the North East Wisconsin Section of the American Chemical Society, held in the lecture room of the Inst. of Paper Chemistry. Members of TAPPI are invited to attend.

W. R. Tutton, formerly with the Toronto Star Ltd., is now in the Research Division of the American Can Company, Medical Arts Bldg., Hamilton, Ontario.

Allen M. Cadigan, recently of the Richavan Investment Company, has returned to the Kraft Pulp Division of the St. Regis Paper Company, Tacoma, Wash., as chief chemist.

Jack Apter, formerly of the New York State College of Forestry is now with Peter J. Schweitzer, Inc., Spotswood, N. J.

Edwin J. Jones, formerly of the Ancram Paper Mills is now chemist for the U. S. Gypsum Company, Rubber Extraction Research Unit, Western Regional Laboratory, Bureau of Agricultural Chemistry and Engineering, Box 1609, Salinas, Cal.

Raymond E. Davis, formerly of Crane & Company, is now chemist for the U. S. Gypsum Company, Farnams, Mass.

Artcher E. Griffin, formerly of the American Cyanamid Company, is now sales manager, Chemical Division, Chesapeake Camp Corporation, Franklin, Va.

Richard J. Murtagh, formerly of the Hercules Powder Company, is now Chemist for the Taggert Corporation, Oswego, N. Y.

Stanley F. Maclaren, formerly of the Hooker Electrochemical Company, is now president of the Regent Pulp and Chemical Company, 52 Vanderbilt Ave., New York 17, N. Y.

The Delaware Valley Section of TAPPI will meet at the Engineers Club, Philadelphia, Pa. on Friday evening, October 6, 1944.

New TAPPI Members

The executive committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Mr. C. L. Crain, Co-ordinator of all Southern Kraft Division Pulp Mills, and Manager of the Georgetown Mill, Southern Kraft Division of International Paper Company, Georgetown, South Carolina.

Mr. Alden L. Holt, Chief Chemist, Hampden Glazed Paper and Card Company, Holyoke, Massachusetts, a 1934 graduate of Northeastern University.

Mr. Joseph T. Loomer, Research and Development Engineer, West Virginia Pulp and Paper Company, Luke, Maryland, a 1938 graduate of the Polytechnic Institute of Brooklyn.

Mr. Gilbert A. Pitman, Vice-President and Manager, Container Testing Laboratories, Inc., San Francisco, California, a 1928 graduate of the University of California.

Mr. Maynard S. Renner, Assistant Research Director, Dewey & Almy Chemical Company, Cambridge, Massachusetts, a 1924 graduate of the University of Illinois.

Mr. Louis E. Wise, Research Associate, the Institute of Paper Chemistry, Appleton, Wisconsin, a 1911 graduate of Columbia University.

Mr. Sampson W. Yates, Superintendent, Carton Plant, The Gardner-Richardson Company, Lockland, Ohio, a 1924 graduate of the University of Toronto.

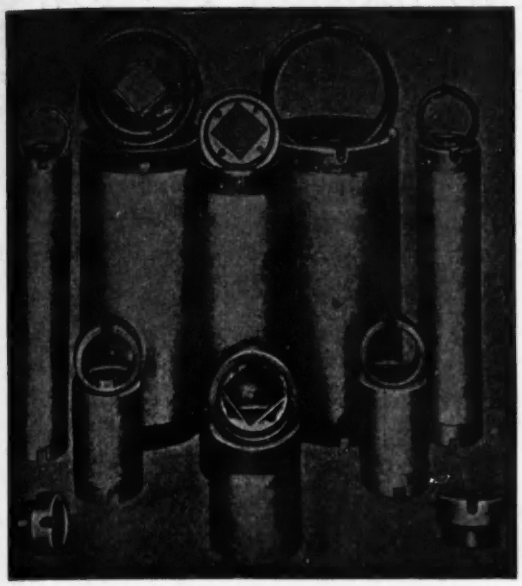
Mr. Curt A. Young, Mechanical Engineer, West Virginia Pulp & Paper Company, 230 Park Avenue, New York, New York, a 1935 graduate of Rensselaer Polytechnic Institute.

Fletcher Employees Get Insurance

Tom Fletcher, vice president of the Fletcher Paper Company, of Alpena, Mich., has announced the adoption of a group insurance program by his company through which employees and their dependents receive hospital expense and surgical operation benefits.

The plan is being underwritten by the Metropolitan Life Insurance Company on a basis whereby the employees contribute fixed amounts and the employer bears the balance of the entire net cost.

Under the terms of the plan, non-occupational disability benefits of $4.50 a day will be paid to an employee when either he or a dependent for whom he is insured becomes hospitalized, while sums ranging, in the case of employees, up to $150, and up to $112.50 for dependents, will be paid for surgical operations, resulting from non-occupational causes. The plan also includes visiting nurse care which is available to employees residing in areas where it is maintained by the insurance company. Supplementing this service is the distribution of pamphlets of health conservation and accident prevention.



ELIXMAN

CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

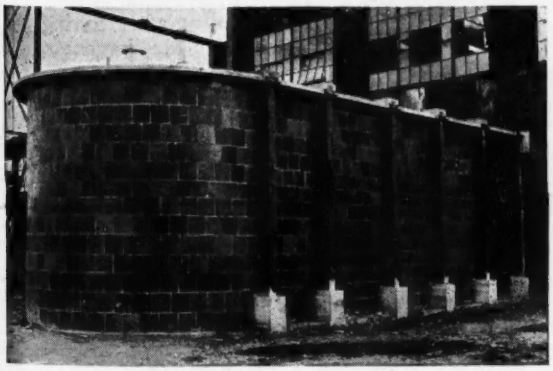
CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.

CORINTH, N. Y.

You Paper Mill Men • *take a Tip on Kalamazoo Tile Stock Tanks and Chests* • *you can't beat them for* **STRENGTH** *and* **DURABILITY** •



Kalamazoo Vitrified Glazed Tile

is a "Natural" for Paper Mill Needs—

Smooth, hard, strong, easily cleaned and highly resistant to chemical action, this marvelous vitrified glazed tile type of construction is preferred by scores of leading paper mill executives and engineers. Adaptable for stock tanks and chests of all kinds. Costs no more than concrete tanks that require constant maintenance expense.

An exclusive method of glazed tile tank construction developed by Kalamazoo engineers. It provides greater flexibility and lower cost for all paper mill stock handling problems. Immediately available.

● Any Size or Shape Desired—

Wide, narrow—shallow or deep. Round, rectangular or square. Half-round or tapered bottom and corners. Midfeathers and fins where needed to control stock flow. Adaptable to pumps or agitators. Construction individually designed to meet space, tonnage or production requirements.

Ask for engineering data.

Kalamazoo TANK & SILO CO.
KALAMAZOO · MICHIGAN

New York Paper and Pulp Market Review

Civilian Paper Supply May Continue Inadequate For Many Months —More Sulphate Pulp Now Being Used For Nitration—New and Old Cotton Rags Are Active — Mills Require More Waste Paper.

Office of the PAPER TRADE JOURNAL,
Wednesday, October 4, 1944.

The current unfavorable supply situation in paper and many paper products is expected to continue for the remainder of the year. Heavy demand is also anticipated for many months after the war, the WPB states. In a general discussion of the paper supply situation, Rex W. Hovey said, after the Overall Paper Industry Advisory Committee meeting last month that, "the general trend of the WPB is toward relaxing orders as soon as possible after X-Day. He pointed out that the problem will not be a simple one in the paper industry. For one thing, the pulp situation is unbalanced and will probably remain so for some time to come; the kraft situation is relatively easy, while a six to eight month shortage lies ahead in sulphite. The shortage in groundwood, book, and fine papers in the fourth quarter is estimated at between 50,000 and 60,000 tons.

Paper production for the week ended September 23 was estimated at 93.7%, compared with 92.2% for 1943, with 87.5% for 1942, with 105.9% for 1941, and with 86.7% for the corresponding week for 1940.

Paper board production for the week ended September 23 was 96.0%, compared with 96.0% for 1943, with 78.0% for 1942, with 98.0% for 1941, and with 78.0% for the corresponding week for 1940.

Wood Pulp

A small increase of about 28,000 tons of wood pulp in the fourth quarter, over the third quarter, may be available, the WPB states. The increase is expected to include 9,000 tons of long fiber bleached pulp, 9,000 tons of soda pulp and about 12,000 more tons of miscellaneous grades, with a small decrease in unbleached kraft.

More pulp will be used for nitration and about 64,000 tons of sulphate will have to be delivered for that purpose, the WPB states. The short supply of wrapping paper and grocery bags has made it advisable to withhold 5% of pulp from board mills. No cut in kraft liner board is expected in the fourth quarter.

Rags

Demand for cotton cuttings continues active. Mill buying is currently reported steady and in good volume. Prices are quite strong at ceiling levels.

Trading in old cotton rags is active. Demand for the roofing grades continues very heavy. Prices are strong at ceiling levels in all grades.

Old Rope and Bagging

Demand for Manila fiber continues heavy and in excess of limited supplies. Prices are firm at ceiling levels.

Demand for scrap bagging continues to show signs of increasing activity but little actual market change has been reported at this date. Prices are soft and nominal.

Old Waste Paper

Mill demand for waste paper is active. The metropolitan market at this date is reported rather tight in some grades. More waste paper is desired to increase inventories at the mills. Prices are quite strong at ceiling levels on all grades.

Twine

The twine market reports demand is active. No important change in prices, demand or in the supply situation has been reported during the current week.

Urge Retention of Newsprint Control

WASHINGTON, D. C., October 2, 1944—Newspaper publishers have strongly urged the War Production Board not to revoke print paper controls on V-day in Europe but to retain the controls "until every newspaper in the United States is assured of an adequate supply of newsprint," the WPB said today.

In a closed meeting last week members of the newspaper industry advisory committee unanimously adopted a resolution declaring that they desired to be relieved of Government paper control as soon as possible, but recommending its continuance until supplies were reasonably adequate or until the industry advocated changes or discontinuance.

Erik Andersen Resigns

Erik Andersen announces that he has resigned from the Pulp and Paper Trading Company and is not, at the present time, connected with anyone in the paper trade. Mr. Andersen's brother, Captain Rolf Andersen, is also at the present time not active in the paper business due to his being on active service with the United States Army. He is at present reporting to Florida for reassignment after having enjoyed a short furlough from the Mediterranean theater.

Mellenville Mill Burned

The Mellenville Division of the Columbia Box Board Mills, Inc., formerly operated by the Berkshire Paper Board Mills, at Mellenville, N. Y., was destroyed by fire Sunday, September 24. The mill contained one 70-inch six cylinder and manufactured chip, filled news, solid news, pasted board and white wood vat lined and colored specialties, having a capacity of 100,000 pounds in 24 hours.

Colombia Uses More Paperboard

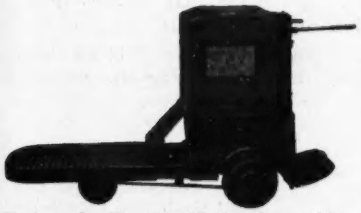
A greatly increased demand for paperboard has developed in Colombia because of a domestic shortage of tin for containers, according to the Department of Commerce. The growth of industrialization and public demand for improved packaging of national products have stimulated the domestic box industry.

WRIGHT-HIBBARD

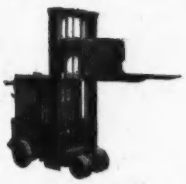
INDUSTRIAL ELECTRIC TRUCK CO.

INCORPORATED

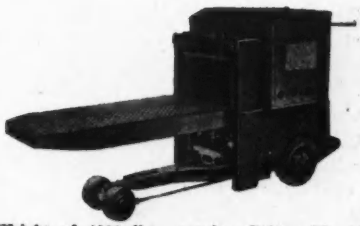
Phelps, New York



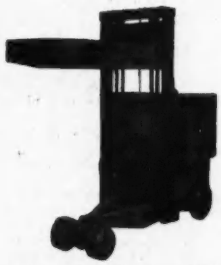
Platform size 24 x 42 x 11" high, low position; 15" high when elevated. Capacity: 2000, 3000, and 4000 pounds.



Capacity 2000 lbs. on forks 30" long. Truck turns from a 5' aisle into an intersecting aisle of 5'.

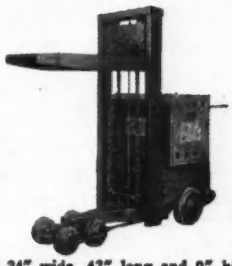


Weight of 4000 lbs. capacity—2850, without battery. Truck turns from a 5' 4" aisle into an intersecting aisle of 4'.



Platform 24" wide, 53" long and 11" high, low position. Capacity 2000, 3000 and 4000 pounds.

The Wright-Hibbard Telescoping high lift truck is designed to operate in the most congested areas of factories and warehouses. The exceptionally narrow width and short overall length found in other Wright-Hibbard trucks are retained in this model.



Platform 24" wide, 42" long and 9" high, low position. Weight of 4000 lb. capacity—2800 without battery.

U.S. PAT. NO. 2062773

MONO PLANE weave

"SMOOTHER SURFACE-LONGER LIFE"

Monoplane weave is an outstanding improvement in Fourdrinier wire construction. It provides maximum support for the sheet. This support is obtained by the use of a hollow shute wire which crimps more readily in the weaving process than the conventional solid wire thereby leaving the warp and shute on one plane. This gives less "wire mark" to the paper surface and because of the long warp knuckles greater wire life is obtained.

Appleton Wire Works, Inc.

APPLETON, WISCONSIN

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 4, 1944.

BLANC FIXE—The market for blanc fixe continues to conform to prevailing quotations. Current demand fair. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton.

BLEACHING POWDER—Current demand is reported good. Supply situation reported satisfactory. Bleaching powder is currently quoted at from $2.50 to $3.10 per 100 pounds. All prices in car lots, in drums, f.o.b. works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 25 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f.o.b. shipping point.

CAUSTIC SODA—Supply situation continues tight, with production high and Government demand reported very heavy. Solid caustic soda is currently quoted at $2.30 per 100 pounds. The flake and ground are currently quoted at $2.70 per 100 pounds. All prices in car lots, in drums, f.o.b. works.

CHINA CLAY—Demand for some grades of china clay is reported moderate this week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mines. Imported china clay is currently quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Production reported excellent. Demand for all uses heavy; all essential requirements fulfilled. Prices remain unchanged. Chlorine is quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b. works.

ROSIN—Lower prices are quoted on some grades of rosin this week: OPA ceiling price on "G" gum rosin is set at $5.55 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at $5.51 per 100 pounds in barrels, New York. Seventy per cent gum rosin is currently offered at $5.82 per 100 pounds, f.o.b. works.

SALT CAKE—Demand reported good. Quotations on salt cake continue to remain unchanged. Domestic salt cake is currently quoted at $16 per ton.

SODA ASH—Market requirements for soda ash continue very heavy. Production reported good but demand is reported in excess of supply. Prices continue unchanged. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Corn is reported coming into market in light volume, and industrial supply situation appears uncertain. Quotations continue unchanged. Pearl is currently quoted at $3.72 per 100 pounds. The powdered grade is currently quoted at $3.83 per 100 pounds. All prices f.o.b. Chicago.

SULPHATE OF ALUMINA—Supply situation is reported favorable. Quotations are unchanged. Prices on the commercial grades are quoted at from $1.15 to $1.25 per 100 pounds. The iron free is currently quoted at $2.35 per 100 pounds. All prices in car lots, in bags, f.o.b. works.

SULPHUR—Demand is reported steady for sulphur. Quotations on all grades continue unchanged. Annual contracts are currently quoted at $16 per long ton, f.o.b. mines. The current contract prices at Gulf Ports remains unchanged at $17.50 per long ton.

TALC—The market for domestic talc is reported moderately active. Quotations unchanged. Domestic grades are quoted at from $16 to $21 per ton, at mines.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—			
Roll, contract...	*$58.00	@	—
Sheets	66.00	"	—
* OPA Maximum Price.			
Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill			
Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping...	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag.....	*4.375	"	—
* OPA Manufacturers' Prices.			
Tissues—Per Ream—Carlots			
White No. 1.....	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½....	1.00	"	—
White No. 2.....	.90	"	—
Anti-Tarnish M.F..	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Toilet—1 M. Sheets—Per Case			
Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet....	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.....	2.20	"	—
Bleached, Jr.	3.20	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute.....11.25		@	—
No. 1 Manila Wrapping, 35 lb.....	6.00	"	6.25
No. 2 Manila Wrapping, 35 lb.....	5.75	"	6.00
Boards, per ton—			
News *48.00		@	—
Chip *48.00		"	—
Sgl. Mla. Lt. Chip*60.00		"	—
White Pat. Coated*75.00		"	—
Kraft Liners 50 lb.*63.00		"	—
Binders Boards... 84.00		"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	32.20 " 37.75	33.35 " 39.25
85% Rag	.... "	29.90 " 35.00
75% Rag	23.00 " 27.00	24.15 " 28.25
65% Rag	.... "	22.80 " 27.75
50% Rag	18.70 " 22.75	19.90 " 24.25
25% Rag	16.40 " 20.00	17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds	Ledgers
No. 1..	$10.55@$12.75	$11.70@$14.25
No. 2..	9.65 " 11.75	10.80 " 13.25
No. 3..	9.20 " 11.25	10.35 " 12.50
No. 4..	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated...	$13.65@	$15.50
No. 2 Glossy Coated...	12.40 "	14.00
No. 3 Glossy Coated...	11.60 "	13.25
No. 4 Glossy Coated...	11.15 "	12.75
No. 1 Antique (watermarked)	10.25 "	11.75
No. 2 Offset	9.60 "	11.00
A Grade E. F.....	9.35 "	10.75
A Grade S. & S. C...	9.60 "	11.00
B Grade E. F.	8.85 "	10.25
B Grade S. C.	9.10 "	10.50
C Grade E. F.	8.55 "	9.75
C Grade S. C.	8.80 "	10.00
D Grade E. F.	8.25 "	9.50
D Grade S. & S. C...	8.50 "	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite.....	$86.00
Unbl. Softwood Sulphite.....	74.00
Bl. Hardwood Sulphite.....	83.50
Unbl. Hardwood Sulphite.....	71.50
Bl. Mitscherlich	81.00
Unbl. Mitscherlich ..72.00 @	82.00
N. Bleached Sulphate	86.00
S. Bleached Sulphate	79.00
N. Semi-Bleached Sulphate...	82.00
S. Semi Bleached Sulphate...	75.00
N. Unbl. Sulphate.....	73.00
S. Unbl. Sulphate	63.50
Bl. Soda	72.00
Unbl. Soda	68.00
Groundwood	50.00

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area).....	10.50
West Coast (out area).....	16.50

	50%-80% Air Dry Weight
Northeast	11.50
Lake Central	11.50
Southern	14.00
West Coast (in area).....	9.50
West Coast (out area).....	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

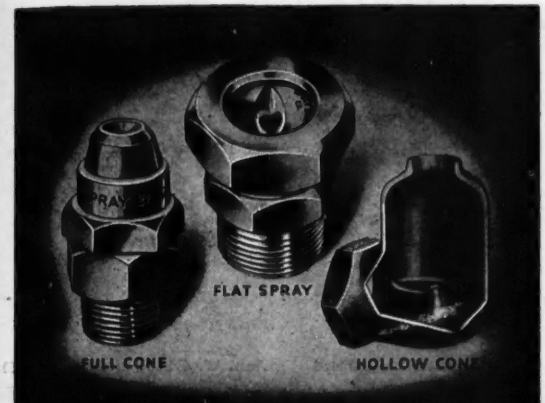
Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags (Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1..	6.50	@	7.25*
Silesias No. 1.....	—	"	5.75*
New Unbleached...	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.50*

* OPA Maximum Prices.



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(for enzyme conversion)

Corn Products Sales Co.

17 Battery Place

NEW YORK 4, N. Y.

Old Rags

White, No. 1—			
Repacked	*3.00	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags			
New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25
Old Rags			
No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.25	@	4.35
Wool Tares, light	4.25	"	4.50
Wool Tares heavy	4.50	"	5.00
Bright Bagging	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	5.50	"	—
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	2.00	"	—

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Mixed Books	1.10	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Mixed Ledger, colored	2.00	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.95	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	1.10	"	—

Twines

All Prices Nominal

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.36	"	—
Unpolished—			
Box	.17½	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.28	"	—
(Hard Fiber)			
Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill.)

Shirt Cuttings—	
New White No. 1	.07¼
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¼
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¼
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¼

Domestic Rags (Old)

White No. 1—Repacked	3.00	"	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
White No. 2—Repacked	2.90	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	@	4.50
No. 1 Clean bright—			
Sisal Strings	.04		
No. 2 Clean bright—			
Sisal Strings	.03		
Sisal Jute	.02½	"	.02¾
Scrap—			
No. 1	3.25	"	3.10
No. 2	1.75	"	1.80
Wool Tares an	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Ledger, colored	2.00	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.40	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuttings, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	—	@	2.50
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	*4.25	"	—
Mixed Rope	—	"	1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	5.25	"	—
Jute Cer ain Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	—	"	2.75
South American	—	"	3.00
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	—	"	3.50
New Zealand Wool Pouches	—	"	3.50
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Roofing Bagging	1.35	"	—

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¼	"	.05
New White No 1.	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06¾
Underwear Cutters, Bleached	.06¼	"	.06¾
Underwear Cutters, Unbleached	.05¼	"	.06
Silesias No. 1	.06	"	.06¾
New Black Silesias	.03	"	.03½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¼	"	.03½
New Canvas	.06¼	"	.06¾
B. V. D. Cuttings	.06¼	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—
No. 2	1.45	"	—
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Rooing Rags	1.45	"	—
No. 1 Roofing Bags	1.45	"	—